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THE MEETING of the Lake Superior Mining Institute, a report of which appears on another page, had three elements of success—a large attendance, several valuable and suggestive papers, and excellent management. The meeting was held this year on the Marquette Iron Range, and full liberty was given to members to visit and inspect a number of the large mines of that region, and study their workings.

The Institute includes in its membership all the prominent men of both the iron and copper districts. It is fortunate, also, in having a large membership among the younger men, who are still in subordinate positions, and who represent the active and growing element, which will be at the head in a few years. This membership and the concentrated interest found in a great and important mining region, insures its activity and future growth.

We note with pleasure that Bewick, Moreing & Co., the mining engineering firm which directs a large proportion of the biggest mines in Western Australia has decided that all of the mines under their charge shall be open for inspection during two days in each month, and it has also been arranged that the output of the mines shall be declared in fine ounces of gold, instead of bullion, as heretofore. We compliment these progressive engineers on the good work they are doing in putting mining onto a business basis.

The lead manufacturers' consolidation, which has been pending for a long time, is gradually being perfected without the co-operation of the National Lead Company, itself a combination. Already some twelve of the largest sheet and pipe lead plants in the East and middle West are understood to have assented to the plan, and the business will be managed by the United Lead Company, which is in the good graces of the smelter trust. The capitalization of the United Lead Company, incorporated some time ago, is $27,000,000, of which $12,000,000 represents bonds ($5,000,000 have been underwritten at 80) to be used, it is reported, in paying for the properties acquired, and $15,000,000 common stock to satisfy the speculative taste of the public. It is noteworthy that this capitalization is $3,000,000 less than that of the National Lead Company, which has also the advantage of owning extensive lead mines in Missouri. That the National Company will be an aggressive competitor of the United is proved by the repeated unsuccessful attempts of the promoters of the new combination to effect an agreement. Future developments in the trade will doubtless be interesting from an economic viewpoint at least, by showing which is the better policy, to control an independent supply of raw material, or to be favored with "confidential" prices and rebates when purchasing in the open market.

THE VALUE OF a patent depends greatly on the manner in which the specifications and claims are drawn, especially the claims. The claims should not, however, be regarded as something distinct from the specifications, since they will be construed in connection with the latter. Patents on many valuable inventions are worthless because of the looseness or narrowness of their claims. In view of the rapidly increasing number of inventions it is becoming more and more difficult to secure a broad patent. A generic patent is now rarely granted; a specific patent is hard to get; most patents issued are on new combinations, and the claims allowed are necessarily narrow, being the more easily evaded the narrower they are. The tendency of the examiners in the Patent Office is to restrict the claims of a new application, and many patent attorneys yield to them without argument, or attempt to secure what their client may really deserve, in order to secure allowance of the application. The patent attorney who undertakes patent applications and makes his fee contingent upon allowance is to be shunned. To be sure of his fee, he will accept such a patent as he can get; not what his client ought to have. If an invention is worth patenting at all, it is worth patenting well, and in this as in other professional work, efficient services are worth their price.

Some of the friends and professional colleagues of the late Major L. I. Seymour, who was killed in action on the Zand River, during the recent war in the Transvaal, have inaugurated a movement for the creation of a fund to be devoted to a fitting and worthy memorial.

In pursuance of this object, subscriptions are now being received by Mr. Francis Drake (at 92 Exploration Building, Johannesburg), who is honorary secretary and treasurer to the General Committee. A large number of representative professional men have subscribed, and in order to permit others, who might desire to do so, to know of this movement, we give it this brief mention in our columns.

Major Seymour commanded, to an extraordinary degree, the affection and respect of the professional men with whom he came in contact, so that those who knew him well continue to regard the untimely end to his distinguished career as a sorrowful personal loss. South Africa may have been the grave of many reputations, military and political, but it has also given a scope for the display of skill and high character such as have added a new dignity to the profession of the mining engineer.

OUTSPOKEN WORDS.

Our Denver contemporary, the *Mining Reporter,* in a recent issue, describes the strike situation in Colorado in outspoken words which ought to do good. We quote the following:

"When it is known that the majority of the working men are honest and willing to do what is right, the marvel is that they lack the moral courage to resist the minority rule. The strike at Cripple Creek illustrates this point. Out of 3,000 miners at work there are probably 2,000 union men. Of this number, not more than one-half really favored the strike, and it is even claimed that a far less percentage than that were actively in favor of it. Practically every man, whether union or non-union, was compelled to quit work at the behest of the Strike Committee. Lessees working for themselves who were not able to be idle, and who were in no way concerned, not even members of the union, were made to quit work and practically driven from camp by threats as to their personal safety if they attempted to work."

Our Denver correspondent confirms this view of the situation. Evidence has been forthcoming to show that the miners' union at Idaho Springs actually did conspire to destroy mining property, and that a small clique of men in the Western Federation is responsible for the continued unrest among the mining population. If the employer and the employed were allowed to settle their own differences without the interference of professional agitators, the mining industry in this country would not suffer from repeated interruptions to prosperous activity. It is a severe handicap to all concerned, to the mine owner, of course, but to the miner, too, even more seriously, in the end. If the press throughout the West came out as frankly and truthfully as our Denver contemporary, whom we have quoted with pleasure, it would conduce to a more healthy condition of affairs. As it is, the daily papers which voice the socialistic tendencies of the labor agitators are impudently outspoken, while the papers which represent the more conservative element in the population are only too often palpable cowards, afraid to speak out because their proprietors might lose the chance of holding office or of controlling nominations to it. The thoughtful part of the community must speak out and create a public opinion which shall be inimical to the excesses of employer and employed alike.

THE LABOR PROBLEM IN SOUTH AFRICA.

On another page we publish a thoughtful article on the question of introducing negro labor from this country to South Africa. The investigation on which this article is based was taken up by a member of our staff in response to a cablegram which we received from a correspondent at Johannesburg, asking for statistical and other data on the subject. The result of the inquiry is negative.

As the mine managers of the Rand had not counted on any aid from the importation of American negroes, the unfavorable verdict of Mr. Newland's investigation will cause no disappointment. It represents, however, one out of the numerous indirect results of the painstaking efforts made by the Chamber of Mines to untie the knot in which the mining industry of the Transvaal is entangled. At the July meeting of the Chamber a motion was carried, without a dissentient, declaring the Chamber of Mines to be in favor of the importation of indentured unskilled alien laborers under legislative restrictions, as it was evident that labor in sufficient quantity for the requirements of the mining industry and the industrial and agricultural population, and for the Public Works Department, was not available in South Africa. It was stated that $1,500,000 had been spent during the preceding nine months in unavailing effort to get the natives from other portions of African territory, and that the scarcity of labor, amounting to one-half what is required for the mines when in full swing, is largely due to the employment of large numbers of Kaffirs on railroad construction and other public works.

In the meantime the government of the Transvaal has appointed a Labor Commission which is investigating the whole matter, and representatives of the Chamber of Mines are making exhaustive enquiries into the question of coolie labor in other countries. That the outcome will be some satisfactory solution of the great obstacle to progress on the Rand, we have every reason to believe; for the problem is receiving the earnest consideration of forceful men. Here in America, the labor problem is different in kind but equally important to the future of the mining industry. When people learn to avoid sloppy sentiment on the one hand and a gladiatorial cynicism on the other, there will be some chance of overcoming the rough places in industrial progress. In South Africa the solution is in the hands of men who have had great experience as employers of workmen in different countries, and who represent also the highly trained intelligence of a profession accustomed to set aside all make-believe. They are likely to face the facts and overcome the obstacles in their way with as much humanity as shrewdness—and there is no reason why these qualities should not go hand in hand.

SMELTING IN AUSTRALIA.

The Smelting & Refining Company, of Australia, Ltd. is receiving favorable notice in London because of its increased production and by reason of the active part it is taking in Australian mining development. This company purchased and reorganized the old concern which operated the smelting works at Dapto, in New South Wales. The geography and economic conditions of a country are as vitally important to a smelting enterprise as they are to military operations; and in this case the condiitons seem eminently favorable. Dapto is on the coast, 55 miles south of Sydney, and 5 miles from Port Kembla, in the region traversed by the Bulli coal measures of New South Wales. The smelter is so placed as to secure a regular supply of cheap coke and coal from mines distant only a few miles from the works; so situated, it commands both the rail and sea traffic of the Australasian regions—that is, not only the states of the Australian mainland, but also Tasmania, New Zealand, New Caledonia, New Guinea, and other parts of the southern hemisphere. By changing the methods and improving the management it appears that the new company has been able to show a profit when operating the smelter on a lead basis; the enterprise appears to have been put on a good footing. Now we learn that a vigorous expansion of operations is planned, by the addition of matting and refining of nickel and copper ores from New Caledonia. There is no fuel suitable for smelting in New Caledonia, but there are the largest bodies of nickel ores known to exist anywhere, therefore the arrangement between the company owning large tracts of such ores and the company owning the Dapto smelter seems to be sound business. The arrangement includes a contract for the output of nickel ores on the one hand and a division of the profit to be made on the smelting of them on the other hand; that is, the two companies will work harmoniously. Further contracts for ores from New Caledonia and other points have also been made by the Smelting Company of Australia. The growth of a smelting and refining establishment is so important to those who are concerned with mining operations south of the equator that it will be watched with interest by many of our readers.

At the present time the Societé Le Nickel ships its crude ores to the Orford Copper Works, New Jersey, at an ocean freight of about 28s., as well as to France, Germany and Wales. This ore averages about 7 per cent nickel and the yield from it goes to the International Nickel Company, the Harvey Steel Company and to other manufacturers. The Smelting Company of Australia expects, we understand, to make a 60 per cent nickel matte, and also refined nickel for shipment to this country, where there is a good market. The import duty here is 6 cents per pound.

The demand for nickel is steadily increasing, its employment for steel rails being a notable recent departure. It remains a question to what extent the nickel trust, without owning the mines, can hold the market; the latter is growing so that complete control of it seems unlikely.

PROFESSIONAL RESPONSIBILITY.

Among recent reports on mines, mention may be made of the report on the Great Cobar copper mine, in New South Wales, by Mr. J. D. Kendall. Apart from the fact that it describes with painstaking care the ore occurrence and physical condition of a well-known Australian property, this report is interesting on account of the fact that it illustrates the growing endency among reputable engineers to state facts so that there can be no possibility of a misunderstanding. Mr. Kendall gives the results of his sampling and investigation under two heads; first, there is the "Ore in sight, *i. e.,* blocked out," which is further explained as meaning "exposed on three or more sides;" then comes the second division of "Ore probable, but not blocked out." Such phraseology indicates an earnest effort to put the case as clearly as possible; there is no hedging; Mr. Kendall has pinned himself down to a close statement which affords just the information which is needed concerning the condition of a mine.

There are professional men who will demur to this; they will suggest that an engineer ought to take more care to protect himself and that it is a mistake to submit such unequivocal statements. We take it, however, that an engineer's first duty is toward his client, his chief purpose should be not merely to safeguard his reputation by ultra-conservatism; he is paid a fee not only for his labor but for the responsibility of forming a judgment. To our mind an engineer who understates the facts is as culpable as one who overstates them; as between the man who, in his desire to be safe, cuts his estimate down beyond the peradventure of being too high and another whose sanguine vision adds a percentage to the ore available in a mine, there is not much to choose. The tendency to err "on the safe side" by avoiding any risks is to be deprecated in the best interests of the profession; it explains, to some extent, the idea prevailing among laymen and the public generally that the most reputable engineers are apt to undervalue mines, just as the less experienced usually exaggerate their worth. A man must be true to himself if he is to be honest to his client, whether that be an individual or a company composed of several

thousand shareholders, and to that end he should face the facts frankly, stating them without subterfuge, so that he may render the service for which he is retained.

In matters of this kind there is great diversity of practice and fundamental difference of opinion. It is desirable that the profession should be a unit on such important matters; whether a man accepts the teachings of the Sunday School or the Stock Exchange his code should include a higher notion of conduct than a line of least resistance or maximum personal safety. Nothing for nothing and very little for ten cents is a synicism which is cut out of the heart of business experience, but judged even by such a standard an individual or a company engaging the services of an engineer is entitled to have the nearest approximation to truth possible within the limits of the evidence obtainable. Large fees are paid in compensation for the risk taken by a man with a reputation to lose and he must, in common parlance, "deliver the goods."

When the commercial side of the question is exhausted there still remain further and better arguments based on a higher ethical code; an engineer is in a position of trust, he should not abuse the confidence of a client by merely hedging, but, accepting the spirit of his engagement, he ought to do his utmost to guide the business actions of the client or company in whose service he is engaged.

Mining will progress the better, the nearer it cleaves to scientific methods; of these the fundamental one is that two and two make four, to say that they make three is as basal an untruth as to say that they make five. Science is organized common sense and that definition precludes all make-believe, whether it swings to the optimistic or to the pessimistic side. Engineers have nothing to do with pessimism or optimism, they have their factor of safety—which is no haphazard deduction—and beyond that it remains simply for them to state the evidence, and their judgment as based upon that evidence, without any subterfuge, evasion or prevarication. If they do so, the profession will gain in usefulness, and mining will become a business which will gain the support of the best men in the community.

COAL MINERS' WAGES IN ALABAMA.

The controversy between the coal mine operators in Alabama and the United Mine Workers, which was referred to a board of arbitration after the miners had been out from July 1 to August 1, is now settled. The board was composed of T. L. Lewis and W. R. Fairley, representing the miners; Charles McCrevy and R. H. Pearson, representing the operators, and Judge George Gray, chairman. It began taking testimony on August 10, and after hearing evidence on many points not directly connected with the questions at issue gave its decision on August 22. The miners asked for an increase of 5 cents per ton in the wage scale—the Alabama coal mining scale being based on the selling price of pig iron—a semi-monthly pay-day, and an 8-hour work day. The operators asked for a change in the differential between mines, objecting to the Pratt mines being taken as the basis; they also asked for a greater differential between machine and pick mining than the existing rate of 7 cents per ton, a lower day-labor wage scale and some award that would tend to make the men work more than 16 or 18 days per month.

The evidence presented threw some light on the cost of making pig iron and the cost of mining coal. The miners gave their expenses in getting out coal, including pick sharpening, powder and dynamite, and described the manner of mining and the varying conditions of coal veins. The operators compared costs of production in Alabama with those in the Pocohontas and Connellsville districts, showing that the production per man in Alabama was not as great. The miners compared earnings in Alabama with those in Illinois, Indiana, Pennsylvania and other States, and offered much testimony concerning the company store or commissary system.

As was to be expected, the figure of costs presented by each side differed, but much of the evidence was of interest to producers of iron outside of Alabama, and a discusion of some of the facts presented will appear in this journal next week.

The award of the Board of Arbitration was a compromise. It advanced miners' wages 2½ cents per ton, the increase originally offered by the operators, gave a semi-monthly pay day and stipulated that boys under 14 years of age should not be employed in the mines. It reduced the price for heading work in some cases, and reduced the differential for the mines of the Central Coal Company in Jefferson County. The award said nothing of an 8-hour day, but did provide for fining or suspending men who are absent from work more than 20 days per month without the permission of foremen, exception being made in case of sickness.

MARKET CONDITIONS.

Silver has assumed renewed strength and prices have advanced to the highest level for some time. To a certain degree speculation is responsible for this rise, though the good inquiry for future delivery has no doubt also been felt. How long the market will maintain its advance, however, is uncertain, as prices will probably be influenced again by the variable purchases for Indian account, which, so far this year have been much smaller than in 1902. On the other hand, it has been consoling to sellers to know that the United States Government has been quite an active buyer for the Philippine coinage, while deliveries to China, France and Germany have also improved. In brief, the status of the silver market will depend largely on the tactics of the American Smelting and Refining Company.

Copper shows some relaxation from last week's pressing orders, and has settled down to the customary quiet. Prices, however, do not exhibit any recession; if anything, they are more firm. The European situation is sympathetically quiet.

Tin has been in somewhat better demand, and prices are practically unchanged.

Lead is still influenced by the limited spot supplies and good demand, which strengthened prices last week. The feature this week is the announcement that arrangements have been completed for consolidating the various manufacturers of lead products. In another column we comment upon the consolidation.

Spelter is in good demand and prices are well maintained.

The iron and steel trade, though showing little or no improvement in prices, is apparently on a firmer basis. The outlook is for pig iron prices remaining at present figures well into the fourth quarter. Northern furnaces having met the cut in quotations made by the Southern Association. While demand for finished products shows little improvement as yet, the firmness of prices in most lines encourages the belief that buyers who have been holding off will soon be in the market. A sale of 40,000 tons of steel bars at the official price is reported. The iron ore market is quiet and old material is in little demand.

In the coal trade there has been no material change during the week. In the Northwest the demand for bituminous coal is still heavy, but remains slack in the Central West. It now looks as though the shipments to the upper lake ports may reach a shortage of 1,000,000 tons, about the same as last year, though the total tonnage forwarded this year will be greater than last. In Chicago territory the market is seasonably dull. The demand at lower lake ports has improved with the starting up of some manufacturing concerns that have been making repairs for a few weeks past. Along the Atlantic seaboard the market is still quiet, though some improvement from shoal water ports is expected. Coke is generally in good supply, and the accumulation at Chicago has led to low prices being made there, but these prices are regarded as temporary.

In the anthracite coal trade demand, while quiet in some territories, is still good, considering the tonnage in the hands of actual consumers. In Chicago territory the market is now quiet, but at some lower lake ports buying has improved. Along the Atlantic seaboard buying is light, except at points beyond Cape Cod, where demand is still brisk.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Books are the money of Literature, but only the counters of Science.

No mistake is so commonly made by clever people as that of assuming a cause to be bad because the arguments of its supporters are, to a great extent, nonsensical.

The man of science simply uses with scrupulous exactness the methods of induction and deduction which we all, habitually and at every moment, use carelessly.

All knowledge is good. It is impossible to say that any fragment of knowledge, however insignificant or remote from one's ordinary pursuits, may not some day be turned to account.

Science is nothing but trained and organized common sense, differing from the latter only as a veteran may differ from a raw recruit; and its methods differ from those of common sense only so far as the guardsman's cut and thrust differ from the manner in which a savage wields his club.

Experience in Germany and France has shown that gas-driven blowing engines are particularly adapted to blast-furnace work. German engineers state that experience has proved that the quantity of waste gas from the furnaces used for a gas-driven engine is about one-fourth of that required to raise steam, in good boilers, to drive a steam blowing engine of the same capacity. The cost of the gas-driven blowing engine, including purifying plant for the gas, is about the same as that of a compound or triple-expansion engine of the best type. With the gas engine, the cost of the boilers will be saved.

Mr. E. J. Dunn, geologist to the Cape Government brought to the Melbourne Technological Museum, about eighteen years ago, some gold which he had collected in the Witwatersrand district from the conglomerate termed "banket." The gold was in the form of a brown dust, the grains of which were so fine as only to be distinguishable under a microscope of high power. When thrown upon a close-grained white paper the dust discolored the paper with a brown stain; this examined by the microscope, proved to be minute gold particles caught in the fibres of the paper. A small quantity of this brown powder put in a test tube with distilled water and shaken up, gave a distinct purple tint to the water in transmitted light, and light green with reflected light; a considerable time elapsed before the metal deposited and the water resumed its natural color.

DISCUSSION.

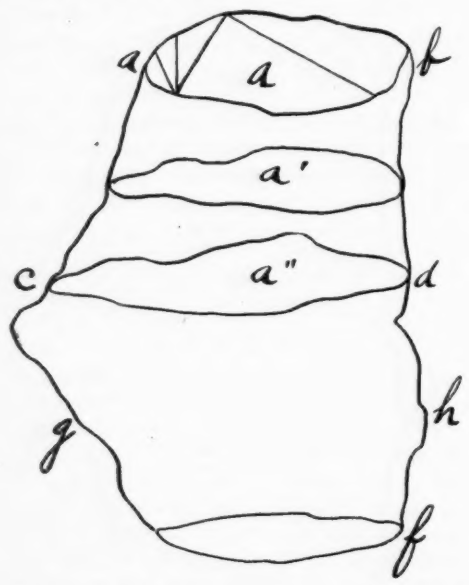
Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

MINE SAMPLING.

The Editor:

Sir.—In the perusal of the articles on the estimation and sampling of ore-bodies, which have appeared in your paper recently, and which, by the way, have afforded me much interest and pleasure, I have not noticed any mention made of the prismoidal formula in its application to the measurement of irregular ore-bodies. Some years since I discussed the value of it in one of a series of papers on mine surveying which I wrote for *Mines and Minerals*. The application of it is so simple and its results are so accurate in practice that I should think its usefulness would appeal to mining engineers, as it always has to civil engineers,. .

Naturally care must be exercised in its use; to illustrate, take a body a c g e f h d b, as shown by the accompanying diagram, the calculation would need to be made first for the smaller volume, a c d b, then for c g e f h d.



Re-entering angles must, of course, also be taken into account, but the three sections of a body being given—top, middle and bottom—their areas can be quickly ascertained by dividing the sections into triangles. The volume of the body, calling the top section a, middle section a', botton section a" and height h, is:

$$\frac{a + 4a' + a''}{6} h$$

I know by frequent use both in the estimation of ore in mines and in piles that it gives results accurate enough for practical purposes.

Another point I would like to bring up is the protection of mine samples. The value of accurate measurement and sampling of ore-bodies is self-evident, but to my mind the protection of the sample from mine to assay office is at least of equal importance. A device which has given great satisfaction to me, and which I have used for years, is a lead seal like that used by the express companies. The seal is of lead 5/8 in. diameter, 1/4 in. thick, with two holes through its circumference large enough for a thin copper wire to pass through. When the sample bag has been tied with the wire passed through the seal the holes in the latter are closed by pressure of a die with a name sunk on one side and some mark or monogram on the other. Any novelty company will make such a die, and usually has the lead seals for sale. Samples, thus sealed, and locked in sole leather bags, also sealed, are safe.

The advantage of using this method as compared to sealing wax is also apparent, where sampling is done in open-cuts or draughts.

New York, August 12, 1903. AUGUSTE MATHEZ.

MINE ACCOUNTS.

The Editor:

Sir.—The concise and creamy presentation of the important subject of gold mine accounts by Mr. H. C. Hoover in a recent number of the JOURNAL* leaves me little chance to get a good hold. But the necessity for discussion of an issue of such vital moment to the mining industry leads me to venture some contribution at this juncture.

Mr. Hoover does yeoman service by shutting off at the outset the puerile plea of diverse conditions, which has too often been the excuse for such woeful chaos as greets the investigator when he begins to attempt the arranging of actual methods into some show of system. The difficulties in the way of uniformity lie mainly in theory and not in practice, arising not from varying conditions, so much as from lack of method or of clean-cut ideas concerning the ends to be sought in systems of account. I presume that many engineers will smile at this statement, at first glance, because there can be no serious difference of opinion among well trained members of the profession as to what ought to be shown by the books. But, unfortunately, the enforced examination of the accounts of many companies proves to the writer the very inadequate manner in which the expected information is obtainable, save in exceptional instances.

Mr. Hoover lays down three methods, or principles, which should govern a proper system of accounts. In my own practice, I have always recommended such measures as would ensure these same results, but, perhaps, from an attitude not exactly similar.

1. *"To prevent fraud * * * and to carry conviction of honesty."* This practically requires the keeping of all records and the summarizing of the same in such manner as to ensure adequate checking of one officer by another. This not only guards against fraudulent intent, but it also protects servants by verifying their records before the opportunity to correct possible errors has passed.

2. *"To show expenditure * * * on some unit basis, etc."* This important end can be accomplished only by the most detailed accumulation of data from all sources, and this is the direction in which looseness is most commonly discerned. Discrepancies arise not so much from misconception or differences of opinion on methods of segregation, as from inability to comprehend the correct principles underlying mine accounts.

3. *"To be presented in such a way that the owner, director, shareholder, or what not may * * * determine something of the efficiency of the manager himself."* Here is a subject which demands careful handling. The best system of accounts for a given business is one capable of yielding minute cost analyses at the hand of an expert, but at the same time adapted to comprehensive summarizing for home office use. Some companies sacrifice everything else to fancied economy, by gathering only totals in the accountant's books, thus rendering very difficult the task of analyzing costs. On the other hand, not a few accumulate details in such heterogenous fashion as to make it impossible to readily obtain grouped footings when required.

The British system, if we may properly apply this term to anything at all, has, I think, developed a morbid tendency to extreme simplification of the general ledger accounts. Mr. Nicol Brown has finally evolved a plan by which four main accounts, with chiefly annual or monthly entries, carry nearly all of the business, in lump. But this necessitates a voluminous and complicated system of schedules to be made up from departmental reports, and in many respects, the scheme is more cumbersome than is acceptable to American usage.

In Mexico, a plan devised for the Compañia Metallurgica and in use elsewhere in that country in more or less modified form, has features which overcome some of the objections to the British style. The principle is to carry on the general ledger a moderate number of prominent accounts, to which totals are posted from journal and cash book, using a subsidiary ledger to take up itemized segregations which may be specialized to any extent deemed desirable. With this system, the accounts are numbered serially and all employees concerned are provided with printed books, giving the complete classification by numbers and titles. In adapting it for use in one instance, we have arranged the general ledger to furnish information ordinarily liable to be required by the home office, which receives the monthly trial balance. A quarterly report of audit of the books also goes to the home office, with an analysis of costs, made independently by the consulting engineer. The subsidiary ledgar furnishes the material at once for such analysis. But the important point with this, as with any system of accounts, is the manner in which the records are kept and assembled for entry in the accountant's books.

I do not know that it is fair to talk of an American system of mine accounts, only we may note the trend of practice in the United States to be towards labor-saving devices in book-keeping. The standard card systems, filing cases and automatic devices are mostly flexible and well adapted to the gathering of data and their preservation in convenient form of study. But comparatively little has thus far been done towards applying these aids in mine accounts. The writer has used such appliances for several years, under a variety of conditions, and always with success. The real work consists in preparing the forms. After that the system almost works itself, and even prejudiced persons soon come to esteem the method and to operate it with keen satisfaction.

If it be possible to formulate a standard system of accounts adaptable to all needs and so planned as to give comparable results as between different operators I take it that some agreement must be reached regarding a number of points on which practice now differs. These matters once adjusted, it would be wise to prepare a skeleton, which, on broad lines, should be very simple and comprehensive in its segregations. Each main division ought then to be divided and sub-divided to give operators free choice of subsidiary accounts.

What are known as "Capital accounts" over-sea, as distinct from cost and revenue (profit and loss) accounts, have not been as clearly defined in American practice. This is due (1) to differences in tax collectors' methods, which, on this side, are variable and rarely introspective; (2) to the difference in attitude of home and foreign investors; (3) to dfferent methods of stock distributon here and there, and (4) to rigid auditing abroad and the sad lack of it at home. These items, however, need only be stated as causes historical, and not as *raisons d'etres* in the premises. Moreover, Mr. Hoover appears to have found his discordant elements largely in a country which is supposed to set the pace for us to follow, for there is no doubt that the British ideals are beyond and above us in their appreciation of the value of accounts. Once let the spirit move us to "get together" in the matter, I venture the prediction that we will evolve a system less cumbersome and unwieldy to accomplish the end in view.

Duly crediting Mr. Hoover with the original suggestions that the Institute of Mining and Metallurgy and the American Institute of Mining Engineers appoint a joint committee to formulate some plan of working cost statements, after discussion of the subject, I have to present a modified proposition, as below:

Let the Institute of Mining and Metallurgy and the Institution of Mining Engineers appoint a joint committee of ten (five from each organization) to act as a British sub-committee to correspond and collect qualified opinions from their membership, and to classify the same, with recommendations. Let the American Institute of Mining Engineers appoint a similar committee of ten to act independently on this side in the same manner and with a similar pur-

* Page 44, present volume, July 11, 1903.

pose. After a given period of deliberation, let each committee of ten select from its own membership two (2) persons to form a new committee of four, to be charged with the duty of developing a plan from the final reports of the larger committees. Meanwhile, the free discussion of the subject in all its bearings need not be restricted in any degree.

I respectfully submit this first draft of a plan which may well be modified in detail by wiser heads. The principle of the idea is one which might also be applied to many other topics of interest; and the fact that many mining engineers are now enrolled in the Institutions (*syn.*, Institutes) on both shores suggests the propriety of establishing one or more joint standing committees on general issues.

In the United States we have not been accustomed to draw the somewhat arbitrary distinction which is made abroad between "gold mine accounts" and mine accounts in general. The former require in reality but the simple framework about which may be built up the more complicated systems rendered necessary by products requiring amplified processes. But, if the necessity exists for standard specifications in the one case, so much the more are they called for in the business of mining and treating complex ores.

The differences in modes of writing up particular items, as mining, development, etc., with other variations in practice mentioned by Mr. Hoover, also the questions raised by your London correspondent, in an article in the same issue of the JOURNAL,* all serve to show the present lack of uniformity in method. To some extent, it may be feared that corresponding discrepancies in purpose may also be discernible. I can only add at this writing that my own practice has encountered somewhat equivalent diversity of need in varying circumstances. But the general plan which covers the systems adopted is susceptible of adjustment to these several requirements, and the books of any corporation using the method will yield cost analyses of a typical form, however much the details may thus be modified. Whether the particular type form is the best for all uses, and how nearly this plan will approximate the standard to be finally adopted are very open questions. It is to be hoped that the whole subject will be amply discussed with a view to the eventual adoption of definite standards by the profession at large.

THEO. B. COMSTOCK

Los Angeles, Cal., August 14, 1903.

THE SAMPLING AND ESTIMATION OF ORE IN A MINE.

To the Readers:

Gentlemen.—In closing the discussion on mine sampling, I desire to take advantage of this department of the JOURNAL to thank those who have contributed their comment and experience. Whatever service the articles on sampling may have done, it has been much increased by the discussion evoked by them.

The effort to give precision to the terms used in describing the ore opened up by mining operations will, I doubt not, leave their influence on the practice of the profession. Already "ore in sight" is tabooed and "ore developed" has appeared in several reports upon mines. Mr. Argall has driven the last nail in the coffin of a phrase which was previously almost *in extremis* by reason of the action of the Institution of Mining and Metallurgy, whose circular (published in the ENGINEERING AND MINING JOURNAL, of October 18, 1902) made a distinct pronouncement concerning the careless use of such terms. In endeavoring to supply a definition the council of the Institution did a good service to engineering practice, but ventured upon dangerous ground. No set terms can always cover the relative degree of evidence to be obtained concerning the tonnage of ore available in different mines. Each mine has its own "personal equation," as it were; in each instance there is a degree of regularity, or irregularity as it may be, of ore occurrence, both as regards value and width, so that two sides of a block as exposed in one class of mine possessing persistent ore-shoots affords better assurance of a certain amount of ore in reserve than four sides in other mines where the vein is sporadic and fickle. This point has been brought out by Messrs. Geo. E. Collins, Chester W. Purington and John C. Treadwell.

This aspect of the enquiry is fitly emphasized by the consideration of unsystematic sampling, as outlined by Mr. Geo. J. Bancroft. The writer happens to know the two engineers whose methods are adumbrated by Mr. Bancroft, and he can appreciate that men of such wide experience can, by the exercise of sagacity, make one or two, apparently unsystematic, tests which will throw more light on the character of a mine than the laborious sampling of an inexperienced man. Short cuts are proverbially dangerous to the novice, while they may be safe to a veteran. There is no doubt that clients who have to pay heavily for the detailed sampling of a large mine will appreciate the acumen of an engineer who by a few tests, judiciously distributed, can, at a small expense, find out the real inwardness of things. This applies particularly to preliminary examinations.

The shape of ore-bodies is an important factor, as Mr. Purington makes clear. One cannot sample intelligently, that is, one cannot arrive at the size and average composition of a large mass of any material unless one has some notion of the shape of it. Here geological structure plays an important part, as it has been my endeavor to show in the two or three instances which I have described. The instances have been invariably founded on fact and described with care, so that many readers must have been able to spot the localities from which they were borrowed.

That sampling is hard work, as well as an important part of mining practice, is a fact scarcely needing emphasis to professional men, but I doubt if it is, as yet, properly appreciated by the people in whose interests it is done. Therefore the detailed description of the sampling of the bottom of a wet level by Mr. Ernest Levy will do good service. Moreover, it suggests the extreme care required to sample underfoot, especially in a wet mine. As a rule, if sufficient data are otherwise procurable, it is best to leave the bottoms of levels alone, because of the great danger of vitiated results due to the washing of fine ore into the channeling made by the moil or pick; moreover, it is rarely possible to be sure that the proper width of ore is being broken when working in the bottom of a drift. The necessity to tear up the track, stop the tramming and interfere with the operations in any part of the mine causes the management to look with disfavor upon the sampling of bottoms and leads usually to the work being done in a hurry, under great discomfort and under serious disadvantage. These tend to impair the reliability of the results. Therefore, if practicable, sample the backs over the level or the nearest winzes in preference. If these are not available, that is, if the ground above the level is stoped out and the ground underfoot has not been penetrated by winzes, then sample underfoot and make up your mind not to be rushed, to do it carefully and to have the operation conducted under your immediate supervision.

Mr. Chester F. Lee asks whether it is admissible to combine several cuts across the vein at short intervals or to take separate samples at greater intervals? To this I would say that the mixing of samples obscures the information which they can give and spreads the element of error. If one is limited, by time or money, in the number of samples to be taken, I would prefer, for example, one hundred separate cuts at intervals of ten feet to the same number of samples obtained by combining every two cuts taken at intervals of five feet. If a bad sample is taken, either by encountering an accidental rich spot or by breaking an undue proportion of one part of the cross-section of the vein, then by mixing this with the next cut, the error is only made so much more difficult of detection. Moreover, such sampling by requiring twice the number of cuts, without any increase of precision, unnecessarily augments the time and labor involved. Each assay result and each width represents a factor in the final calculations for tonnage and value; the more of these there are the closer the estimate. But by combining two adjacent cuts there is no increase in the number of assay results, although there may be double the number of measurements for width. In an erratic ore-streak the latter would prove useful.

While the moil is the accepted tool for sampling, the gad is advocated by Mr. Lee and the small pick by Mr. Walter H. Weed. In certain places underground a gad, fitted with a handle, is more serviceable than a moil, that is, when the ore to be sampled is so situated that one cannot hold a moil in the left hand so as to strike it with the hammer held in the right. The gad with a handle is one of the oldest implements of the miner, and figures in the insignia of the Schools of Mines at Leoben and Clausthal. As to the small pick, the geologist's or expert's pick, as it would be termed in the West, it is useful in preliminary sampling and in testing various parts of a vein to find out which streaks carry the values, but I am loath to recommend it for systematic sampling, especially in hard ground. It can be used by an experienced man with descretion to good purpose, but I would advise the younger engineers to leave it at home or in the blacksmith's shop. Much the same is true of the 'grab' sample which I consigned to perdition as being at the root of so many untrustworthy estimates of ore. Mr. W. M. Courtis and Mr. Albion S. Howe say, very properly, that the grab sample is serviceable in finding out which band of ore, in a multiple vein, carries the values and in this way, by taking one or two grab samples, Mr. Courtis has saved himself, on more than one occasion, from being salted. Here too, for a specific purpose, this method is well enough, but as a general way of arriving at the tonnage and value of large bodies of ore, it is hopelessly unscientific; in fact the very notion of a "grab," that is, to seize blindly at a handful of broken ore, with the idea that by being blind you are impartial, is wholly opposed to the earnest effort to eliminate the element of chance as much as possible, by collecting the maximum number of data, and applying to them the doctrine of averages—which is the basis of systematic sampling.

T. A. RICKARD.

New York, Aug 25, 1903.

(*To be Continued.*)

THE WORLD'S LONGEST TUNNEL.—According to the latest account the great Simplon tunnel of the Alps is about three-quarters completed, and when finished will be 14 miles long, or twice the size of the Mont Cenis bore. It is expected that the Simplon tunnel will be ready for use in about two years. One of the greatest obstacles encountered in the work is the high temperature in the center of the bore, which compels the employment of two gangs of men on short shifts. Power for compressing air for the drills and refrigerating the tunnel is furnished by a flow of water from the south end of the bore at the rate of 15,000 gals. per minute. It is estimated that the cost of the tunnel alone will be about $1,000,000 per mile, or nearly the same as the contract for the subway under New York city.

Calcite, when perfectly transparent and free from aws, has great value for optical purposes. The locality which has yielded the largest quantity of fine calcite crystals is near Eskifjördhr, Iceland, and for this reason crystals of good quality are commonly termed Iceland spar.

* "The Payment of Extensions of Mining Plant Out of Revenue." This volume, p. 48.

LAKE SUPERIOR MINING INSTITUTE.

Specially Reported.

The ninth annual meeting of the Institute began at Ishpeming, Mich., on Tuesday morning, August 18, with a large number of members present. After assembling at the Nelson House, the party took a special train for Negaunee, where a visit was made to the Maas mine, and the surface works there were carefully inspected.

The Maas is located in a new territory some distance from any other working. The indications pointing to the existence of an ore-body, boring was undertaken on an extensive scale, and the results were so encouraging that the sinking of a shaft was started. This has proved a difficult and costly work, owing to the existence of quicksand. A period of over 18 months has been occupied in sinking the shaft 160 ft., all the way in sand, with a heavy flow of water, which has made it necessary to use very heavy pumping engines, besides requiring most careful timbering. The shaft has just reached the rock, and must be sunk nearly 600 ft. further before entering the ore-body. The mine is owned by the United States Steel Corporation.

In the afternoon another special train was provided, which took the members to several of the mines near Ishpeming. Section 16 mine, the old mine of the Pittsburg & Lake Angeline Company, the Lake shaft of the Cleveland Cliffs Company, the Winthrop mine and Section 21 mine of the Lake Superior Company were visited in succession. At the Lake shaft, a number of the visitors went down.

The Winthrop presents some special points of interest. It is one of the few open-cut workings left in this district. It is near the summit of a hill northeast of Ishpeming, and very little surface stripping was required. The ore is worked in a large open-cut or quarry, semi-circular in form. It is broken down by drilling and blasting and loaded into mine cars on a system of tracks, which all lead to a chute placed in the center on the face of the hill. Through this chute it falls into a tramcar, which is hauled up to the crusher. This is of the gyratory type, placed about 40 ft. above the track level. Everything coming from the mine passes through the crusher, the broken ore falling through a chute directly into the railroad cars, which stand on a siding below. The Winthrop is also peculiar, in that it is the only low-grade hard ore mine now worked on this range. The ore runs between 37 and 40 per cent. iron, and below 0.003 phosphorus. It is found valuable as a mixture in the furnace with some high-grade ores which are low in silica. The mine, which is owned by the United States Steel Corporation, is now shipping 4,500 tons a day. It is claimed that the cost of putting it on the cars is not over 25c. a ton.

The other mines visited were Section 21, the Lake shaft of the Cleveland-Cliffs Iron Company and the Old Mine of the Pittsburg & Lake Angeline Company. At the Lake shaft a number of the members went underground. The old shaft there will shortly go out of commission, a new shaft having been completed, which will be used as soon as the head-gear is completed and the engine erected.

One point noticed was that the Lake Superior Company is using Gates crushers at Section 21, at Section 16 and at the Winthrop. This is somewhat of an innovation, the use of jaw crushers having been heretofore general in this region.

At Section 21 an exhibition was given of an unloader designed by Mr. Greenway, the superintendent. This machine is designed for use with car-loads of ore which have packed at the bottom—as ore will often do when wet—or with frozen ore. The machine consists of a traveler placed on guides above the railroad track, and carrying a vertical shaft provided with arms or spikes. The traveler is moved over the length of the ore-car, the shaft being rotated at the same time. With wet ore, a sort of arch often forms at the bottom of the car, which will not give way when the hoppers are open. The rotating shaft, with its spike-like arms, breaks this arch up, and the ore falls freely through the hopper. With frozen ore, a large auger is substituted for the spiked shaft. The shaft, or auger, has a double motion; besides the rotation, it can be raised or lowered, as required, while the traveler moves it in the direction of the length of the car.

The first session was held in the Opera House at Ishpeming on Tuesday evening. The retiring president, Mr. Walter Fitch, general manager of the Champion mine, delivered his annual address, in which he congratulated the Institute on its prosperous condition. He referred to the general activity in the mines and the large shipments made for the past two years, which have resulted in giving work to every available man, and to general prosperity throughout the district. He also spoke of the results of the extensive ownership of mines by the United States Steel Corporation. So far, this has had a regulating and steadying effect. There has been an absence of competition for sales of ore; a better distribution of work among the different mines, and a steadiness in lake freights heretofore unknown. These conditions have benefited the ore shippers outside the trust, so far; what the effect may be, when the present period of great demand passes, remains to be seen.

Mr. H. F. Ellard, of Ironwood, then read an interesting paper on the 'Sinking and Equipping of No. 9 shaft, Ashland Mine.' We hope to present a summary of this paper hereafter.

Capt. J. H. Karkeek, of Iron Mountain, read a paper on the 'Use if High Explosives and Safe Methods of Handling.' In this he spoke at some length on the need of greater discrimination in selecting explosives, with reference to the special character of the work to be done. He also explained the best methods of caring for, handling and storing high explosives. Finally, he gave some practical hints on the best and safest way of thawing frozen dynamite. The paper gave rise to a brief discussion.

The next paper was on 'Mine Accounting,' by Mr. Walter M. Jeffrey, auditor of the United States Steel Corporation's mining department. He described the methods of keeping mine costs in use in his department, besides giving an account of the general system adopted. He referred also to the charges for depreciation made in the mining operations of the corporation. It is difficult to summarize this valuable paper, which we hope to present later.

This was followed by rather an animated discussion, in which Messrs. Channing, Kelly, Jackson, Fitch and Prof. Sperr took part. The discussion referred chiefly to depreciation charges, the proper methods of making and appropriating them.

The last paper read was on the 'Charcoal Industry of Northern Michigan,' by Mr. William G. Mather. The first part of this paper was chiefly statistical, showing the position of the charcoal iron industry at various periods with reference to the total output of pig iron. The second part was historical, referring to the different charcoal furnaces which had made iron in the upper peninsula, and in the northern part of the lower peninsula of Michigan. The concluding section described the latest charcoal furnaces and those now in operation. Mr. Mather, in conclusion, claimed that the industry was a source of benefit, since the charcoal maker cleared areas of timber land, which then became available for the use of the farmer. The paper was illustrated by a number of lantern slides, giving views of old furnaces, besides several existing ones.

Among the visitors at the meeting were several of the Michigan commissioners to the St. Louis Exposition, accompanied by Prof. J. A. Holmes, head of the Department of Mines and Metallurgy at the Exposition.

On Wednesday morning, at 9:30, the members took a special train for Marquette. There an hour was spent in inspecting the new Pioneer furnace, the largest charcoal furnace now in existence. The furnace stands close to the bay, a little way from the town of Marquette. The plant includes one stack, with the necessary buildings; a number of charcoal ovens and a chemical plant for treating by-products. Machinery is of the latest design, including a fine Southwark compound blowing engine. The boilers are provided with automatic stokers for using slack or run-of-mine coal. The charcoal kilns are of the beehive type. The smoke and gases from the kilns are conveyed to the collecting house, where the acid gases are neutralized by passing over lime. The gases then pass to the condenser house, where they are condensed; and then to the purifying house, where the tar and heavy oil are separated. The by-products are wood-alcohol, acetate of lime and tar. There is also a small quantity of a heavy oil, for which no use has been found, as yet. A part of the tar is used as fuel in one of the boilers. The acetate of lime is shipped to Germany, under a contract with one of the chemical syndicates in that country.

From Marquette the train proceeded to Munising, where members spent the afternoon chiefly on the lake. Boats were provided, which took the visitors to Grand Island and other points, giving them a view of the famous "pictured rocks." Most of the land around Munising belongs to the Cleveland-Cliffs Iron Company, which is building a large pulp plant and paper mill there.

The second session was held in the Court House at Munising. Two papers were read—one on the new change-house at the Cliffs shaft, Ishpeming, by John S. Mennie, describing that building and its arrangement. The other was on the 'Champion Mill Intake Tunnel,' by F. W. O'Neil. This was illustrated by a large drawing. The tunnel furnishes water to the new stamp-mill of the Champion mine. Starting from a shaft sunk at the pump-house, the tunnel runs out 160 ft. through the sandstone under the bottom of the lake. Its outer end is covered by a crib, which is placed well below the surface, in order to avoid trouble from ice. The total cost was $41,895, shaft-sinking showing an average of $40.90 per foot, and tunneling, $11.71 per foot. The tunnel and pumps can supply 49,000,000 gals. water per day, the quantity which will be needed when the full mill of eight stamps is completed. At present, only three stamps are in use.

Mr. F. W. Denton's paper on a 'Card System of Mine Supply Accounts,' and Prof. F. W. Sperr's paper on 'Materials other than Wood for Shaft Linings,' were read by title, and will appear later. Mr. Chase S. Osborne gave a brief and interesting summary of his paper on the 'Iron Ore Deposits of Arctic Lapland.' The complete paper will include full reports on the noted mines of Gellivara, Kirunavara and Luossavara.

After the reading of the papers the business meeting was held. The report of the council showed that there are 310 members, an increase of 60 during the year. The cash balance in the treasury is $1,962. The council recommended an increase in the yearly dues from $2 to $5. This was referred to letter ballot. A list of 92 new members was submitted and approved by the meeting.

The following officers were elected for the ensuing year: President, G. H. Abell, Hurley, Wis.; Vice-presidents, J. H. McLane, Ironwood, Mich.; J. B. Cooper, South Lake Linden, Mich.; Managers, John McDowell, Hibbing, Minn.; W. J. Richards, Crystal Falls, Mich.; Treasurer, E. W. Hopkins, Commonwealth, Wis.; Secretary, A. J. Yungbluth, Ishpeming, Mich.

After the meeting the special train, composed of sleeping cars, left Munising about midnight, arriving at the Sault Ste. Marie early in the morning. The morning was spent in visiting the new power plant at the Sault; the visitors then crossed to the Canadian side in a steamer and were allowed free inspection of the great plant of the Lake Superior Consolidated Company. These extensive works—the Clergue plant—are at present entirely idle, with the exception of the paper mill. In the afternoon the members were taken 35 miles up the Algoma Central Railroad, which is part of the Clergue enterprise.

In the evening a reception to the members of the Institute was given in the building of the Country Club. At midnight again, the special train left the Sault on its return to Ishpeming, thus closing a very successful and enjoyable meeting.

ACROSS THE SAN JUAN MOUNTAINS.

By T. A. RICKARD.

(*Continued from page 270.*)

Beyond Eureka we passed the Silver Wing and the Tom Moore mines, and just below Animas Forks we turned eastward and started the ascent of Cinnamon Pass. This is at an altitude of 12,600 ft. and separates the watershed of the Animas from that of the Lake Fork of the Gunnison River. On the divide is the Isolde mine, in the andesite breccia, also the Bon Homme, in granite, and lower down we passed the tramway being constructed for the Tabasco mine. The bright glint of a thick copper wire bespoke a line of electric transmission connecting the mine and mill with a power station situated on the further edge of Burroughs Park. As the copper wire caught the sunlight one could not but be reminded of the aid given by one metal to the other; the electric transmission of the energy of water has done much for gold-mining at high altitudes, where fuel for steam-power generation entails a cost which is almost prohibitive. Several very successful installations have been made in the Silverton district. The application of this form of engineering was limited until recent years. So long as the direct current only was available the transmission of power by electricity had severe restrictions, because under that system the practical limit was 700 volts[1], and it was not possible to augment this by the use of transformers. Since the introduction of the alternating current these limitations have been swept away, and the voltage can be raised to a degree the practical limit of which is dependent upon the insulation of the transformers. In practice the voltage is usually raised so that the power can be transmitted over a wire not smaller than No. 5, because that size gives the lowest investment in copper. The old and the new systems of electric transmission can be compared by stating that an alternating current at 2,000 volts would require only one-sixteenth of the copper that would be required by the same current at a pressure of 500 volts transmitted by a direct current, per horse-power, per given distance and at a given loss. The cost of power, as sold by the large generating companies in the mountains, to the mines at timber line or near it, averages about $8 per horse-power per month.

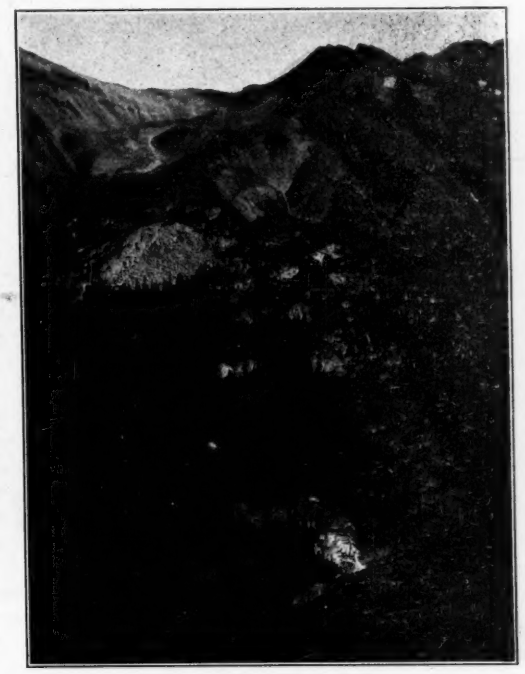
The advantage of electric transmission of power in place of the painful transport of fuel to the mines above timber line can be gauged by a look at the trails which frequently afford the only means of communication between the valleys and the mines. This is well illustrated in the accompanying photograph[2] of a trail to one of the Silver Lake group of mines.

The Silver Lake installation was the first multiphase plant in the San Juan region. It was installed eight years ago, and operates a great variety of machinery, such as drills, pumps, hoists, blowers, machine shop, etc. The line is 3 miles long. A compound condensing engine has replaced water-power because the generating station is on the railroad, so that coal can be delivered cheaply (it comes from near Durango), while the water-power available was both insufficient and precarious on account of the damage to the long flume, brought about by rock-slides, snow-slides and the other difficulties of a high altitude subjected to violent extremes of heat and cold.

Below the Tabasco mill we met a wagon heavily loaded with bed-plates, for an engine, bearing the name of the Colorado Iron Works, and soon afterward, riding through a belt of pines, we found ourselves in the open valley of Burroughs Park. This district has been, during the past two years, the scene of active prospecting and some mining. We dismounted and partook of hospitalities tendered by Mr. George Peirce, who subsequently piloted us to the Cleveland group of veins. These are not as yet of economic importance, but they have characteristics which are interesting from a scientific point of view. They penetrate granite; the Monticello vein, which I saw, was about one foot thick; for the first 15 ft. in depth the vein consisted of cellular quartz marked by copper stains, but otherwise it was said to be barren; lower down it became metal-bearing, and at about 45 ft. deep I found a piece of copper pyrite coated with a gray film of chalcocite, suggestive of secondary enrichment and reminding me of certain experiments made by Mr. H. V. Winchell at Butte, in the course of which the copper of a sulphate solution was found after a time to have precipitated a film of gray copper sulphide upon the bright facets of crystals of copper pyrite.[3]

In the afternoon we left this locality and rode down Burroughs Park and along the Lake Fork of the Gunnison until in the evening we pulled up at the Golden Fleece mine, beside Lake San Cristobal. The road at first goes over granite covered with an occasional patch of andesite breccia, such as the one in which the Champion mine is situated. Then it cuts into the Algonkian schists and quartzites. Just before reaching the lake the road and stream follow close to the contact between upturned schist and the overlying andesite breccia. Near the lake, decomposed andesite breccia becomes the prevailing formation. The road follows the contour line of the lake-shore and afforded us a glorious canter in and out among scattered young pines; there came glimpses of placid water reflecting the resplendent coloring of the aspens which clustered upon the encircling hill-slopes, and the bright warm tints of clouds which caught the sunset glow. Suddenly in turning a corner the road ran amid a group of cabins and other buildings, the busy aspect of which told us we were at our destination, the Golden Fleece mine.

SILVER LAKE TRAIL.



BURROUGHS PARK, COLO.

In the summer of 1896 the Golden Fleece mine shipped nine carloads of ore weighing about ten tons each, the poorest of which netted $33,000 and the richest $49,500. In a few months the bonanza yielded $1,600,000. This rich ore was characterized by petzite (Au 25 per cent, Ag 41 per cent, Te 34 per cent) and ruby silver (proustite) scattered through a dark chalcedonic quartz or hornstone.

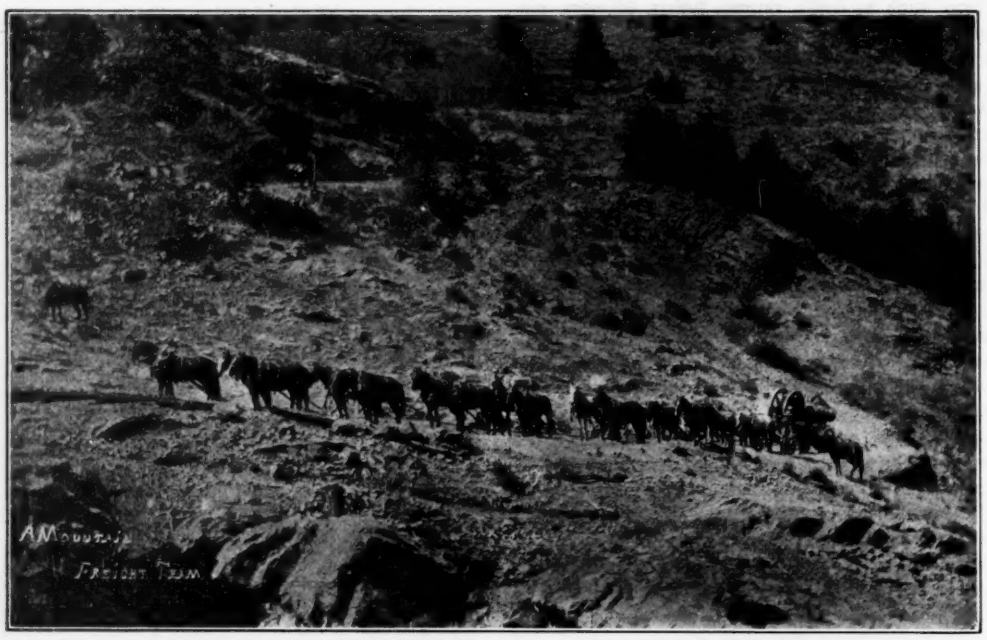
The story of this mine exhibits the uncertainties of digging for gold. In 1874 Captain Enos T. Hotchkiss, connected with a government surveying party which was laying out a toll-road from Saguache to Lake City, caught sight of the outcrop, standing conspicuously above the hill-slope, and examined it. He located it as the "Hotchkiss" mine, and had some assessment work done while he was engaged in his survey-work in the vicinity. As far as is known, he found no ore. A year later, when Hotchkiss had abandoned his claim, it was re-located by George Wilson and Chris Johnson, under the name of "The Golden Fleece." They began what is now known as the No. 1 tunnel, but finding only little stringers of rich ore they ceased work. Others did similar desultory prospecting. O. P. Posey found a very rich bunch of ore in the croppings above the No. 1 tunnel and took out several hundred pounds, which were packed to Del Norte and sent thence to the Pueblo smelter. Then John J. Crooke took a lease and bond; he also extracted about $30,000 from the outcrop above No. 1 tunnel, which had been extended a little further, without result. This was between 1876 and 1878. In 1889 Charles Davis took a lease and bond; he did a good deal of work along the high croppings, and finally sunk a shaft 30 ft. deep, which struck a body of ore yielding $40,000 in a very short time. Late in that year, 1889, George W. Peirce bought the mine for $50,000, and commenced extensive explorations. He found out very

[1] Although the Virginius mine uses 900 volts. This plant was erected before the introduction of the multiphase alternating current, and the high cost for copper wire over a four-mile line prompted the adoption of this unusually high pressure for a direct current.

[2] Trans. A. I. M. E. Vol. XXVI., p. 423.

[3] These experiments have been described in detail lately. "The Synthesis of Chalcocite," by H. V. Winchell, ENGINEERING AND MINING JOURNAL, May 23, 1903.

soon, indeed, that Davis had extracted all the ore in sight, and the outlook was not cheerful. All the work up to this time had been to the north, on the supposition that the vein had been faulted in that direction. The new owners cross-cut south at the No. 2 tunnel, which had been previously extended a little way, but had found nothing. The vein was



HAULING MACHINERY TO THE MINES.

picked up, but not much ore was encountered at first. They persisted, however, and within a year rich ore was cut on No. 2, and it was traced upward until it became easy to intercept the same body at No. 1. It was discovered that the former owners had been within ten feet of the main ore body of the mine, which from that time, and until 1897, was very profitable.

(*To be continued.*)

THE AMERICAN NEGRO FOR SOUTH AFRICA.

By D. H. Newland.

In a previous issue of The Engineering and Mining Journal attention was called to the possible solution of the labor question on the Rand by the importation of American negroes. This plan was suggested in the belief that, if successfully carried out, it would work to the benefit of both countries concerned, not only relieving the necessities of the great mining industry of the Transvaal, but removing from our midst a portion of a population that is becoming more and more a drag upon economic progress. As the suggestion has met with serious consideration, we have been encouraged to undertake a closer investigation of the negro laborer in this country, with a view of determining whether any large quota of efficient workmen could be enlisted for service in South Africa.

An advance statement furnished by the Census Bureau, at Washington, summarizes the statistics of negro population and occupations in 1900, as follows: Total population, 8,786,210; males, 4,393,221; male laborers, 2,862,091; males, 16 to 44 years of age, 1,876,269; male laborers, 16 to 44 years, 1,741,910; farmers, planters and overseers, 389,902; agricultural laborers, 496,477; miners and quarrymen, 29,931; trade and transportation, 160,842; manufacturing and mechanical pursuits, 148,641. The negro thus forms so large an element in the population that the removal of 100,000 or more would not seriously effect his social status, so far as mere numbers are concerned. Naturally the supply would be drawn from the class of laborers ranging from about 20 to 40 years of age, of which there are approximately 1,200,000. The difficulties that are necessarily involved in enlisting recruits for such an enterprise are greatly simplified by the fact that the colored population is concentrated in one section of the country. This is well brought out by the statistics of the Census of 1890, which show that no less than 6,740,000 negroes, or 90 per cent of the total population were inhabitants of the 16 States comprising the South Atlantic and South Central divisions.

As regards the character of the negro laborer, which, of course, must be taken seriously into account in a matter of this kind, there are few trustworthy sources of information. Such investigations as have been made are chiefly of local value, being intended to present the conditions existing in a single class or community, and do not give a comprehensive view of the general body of laborers. Of the great mass of material that has been published in newspapers and magazines, there is little that does not show the influence of partisan spirit, accentuating either the good or the bad sides of the negro. Undoubtedly, the most valuable contributions on this subject have been made by the officials of the Department of Labor; and while no broad generalizations should be based upon these studies, they, nevertheless, give an accurate and quite representative account of the character and habits of the negro in the Southern States.

Professor W. E. B. Du Bois, of Atlanta University, an authority on negro sociology, has made an extensive study of the negro in the "Black Belt" of Georgia. In 1890 this State had a colored population of 858,815, or 11 per cent of the total number of negroes in the United States. In describing the life in a small country village of this section, Professor Du Bois states that the inhabitants are degraded and intemperate. A census of 11 families in this village showed an average of nearly 12 persons to a family. Five of the families owned their homes, together with land worth from $100 to $400. The moral condition of the village was decidedly low. In a larger village of 3,000 inhabitants, in which the conditions were somewhat more favorable than those described, Professor Du Bois found that many of the negroes were industrious, but earned small wages. The average yearly income of the negro family was between $300 and $500, and the majority of the families owned their homes. The average size of the family was 3.76 members. The men were engaged as janitors, drivers, general servants, farm-hands, etc., earning from $10 to $12 a month, besides board and often help in other ways. Among skilled laborers there were a few carpenters, painters, masons and blacksmiths. The white and negro mechanics worked together without apparent friction, and usually received the same pay. A great deal of idleness and loafing was manifest, which was partly due to the fact that work was abundant at certain seasons and scarce at others, and also to a general spirit of shiftlessness. A study of a farming community showed that the negro agriculturist possessed little ability to manage and economize, and was generally unsuccessful. The younger people readily drifted into immorality and crime.

In a recent bulletin issued by the Department of Labor there is a description of the negro laborers on the sugar plantations of Louisiana. In a typical locality the average number of persons to a family is 3.90. The wages paid to workmen range from 70c. a day in the cultivating season to 90c. a day in the grinding season. The factory laborers work in six-hour shifts, night and day, during the grinding season. With a few exceptions, the negroes show no tendency to frugality, buying anything they can obtain on credit without thought of the future. "They lack ambition and prefer idleness and want to exertion and plenty." Many of the best workers spend a large part of the time in gambling. On some plantations, in recent years, there has been a steady decrease in the number of negro laborers; their places being taken by Italians. The negroes are little inclined to steady work, and are drifting into the towns and cities.

A census of the negro population in Atlanta shows that the average family contains 3.99 persons. About 22 per cent of the families own their homes. The occupations are extremely varied, and the earnings range from a minimum of $2 to a maximum of $40 or more a week, the average being about $6 or $7. A very large number are supported by charity when unemployed. In 1899 there were 1,063 negroes owning real estate of a total assessed value of $793,910. The colored population of Atlanta in 1895 was 36,857.

In all of the large cities of the South there are great numbers of negroes who have no definite occupation, and are more or less vicious and demoralized. Their physical condition is exhibited to some extent in the vital statistics, the rate of mortality invariably being much higher among the colored than among the white population of the same city. In 1890 the average rate of deaths per 1,000 in Atlanta was 36.73 for the negroes and 21.19 for the whites, an excess of 73.51 per cent among the former. In the same year the respective rates for other cities were: Baltimore, 32.37 per cent and 21.66 per cent; Richmond, 42.25 and 23.78 per cent; Charleston, 42.30 and 21.36 per cent, and Memphis, 24.59 per cent and 17.84 per cent. The import of these statistics is further emphasized by a low birth rate, and it seems to be a general fact that the colored population of large cities is maintained only by the steady immigration from country districts.

While it is impossible, owing to the absence of reliable data, to differentiate the negro population into classes according to their character and capabilities, there is abundant testimony that an abnormally large proportion is composed of the idle and thriftless who are still involved in the mental and moral degradation that characterized their lives under slavery. The laborers on the cotton and sugar plantations of the South, who have no interest in the land they cultivate, live in superstititon, poverty and ignorance. A few of the more intelligent and industrious have become property holders on a small scale, but they are generally unprogressive. There is abundant opportunity for the farm laborer to improve his condition, as land is cheap and the products, especially cotton, find a ready market at good prices. The urban population shows little, if any, improvement. It is in the cities that the highest ratio of idle to industrious negroes exists, and it is here that the most vicious specimens of the race are to be found. The middle-sized manufacturing town probably presents the most favorable conditions. The industrial awakening which has been manifested throughout the Southern States during the last ten years has led to the establishment of numerous small manufacturing cities, where the raw materials of the South are converted into finished products. In these towns the negro finds many of the social advantages of city life, but at the same time he is removed from its worst vices. Living is comparatively cheap, wages fairly good, and labor is in steady demand throughout the

year. A very respectable proportion of the colored citizens of such towns are efficient laborers. A census of negro labor in manufacturing occupations was taken by Atlanta University in 1901; the results showed that 20 per cent of the laborers were skilled or semi-skilled, representing nearly every kind of employment, and that the majority of the skilled workmen earned from $1.50 to $3 a day.

In general the number of skilled laborers among the negroes, compared with the total population, is insignificant. According to the Census of 1900, there are only about 30,000 engaged in the mining and quarrying industries—a very small proportion, when the importance of these industries in the South is considered. It seems probable that the number may be understated somewhat, as one authority says that in 1900 there were from 8,000 to 10,000 negro miners in the Flat Top coal-fields of West Virginia alone. Besides the coal and iron mines, which are the leading mining industries of the South, the phosphate fields of Florida, South Carolina and Tennessee employ a few thousand negroes, but the character of the work is such that they can hardly be classed as miners or skilled laborers. In the coal and metal mines of the Northern and Western States there are very few negro workmen. The Pennsylvania coal mines in 1890 gave employment to 849 negroes, out of a total population of 107,576, while Colorado, which is pre-eminently a mining State, had only 142 colored miners.

Mining is an attractive field for the efficient laborer, and it seems strange that the negro, if he is really desirous of bettering his condition, has not taken up this occupation in larger numbers. The wages, as compared with other employments, are high, and the working hours are short. The Miners' Union is one of the few labor organizations which admits the negro into membership on an equality with the whites. The negro seems to be indifferent, however, to the opportunities afforded him, and the foreign laborer—largely from Central Europe—is the chief element in the mining population of most of the States.

On the whole, it seems probable that many difficulties would be encountered in securing any large number of efficient laborers for transportation to a foreign country. It would doubtless be easy to enlist unskilled laborers, provided there were no rigid restrictions as to personal morale and competence. They could be obtained in the larger cities and the country districts. They would be representative largely of the idle masses. What the potential capabilities of this class are when placed in new surroundings, where labor would be more or less compulsory, can only be determined by experiment. So far as known, there has been but one attempt in recent years to export negro laborers to a foreign country. In 1901 about 100 families were taken from Alabama and Louisiana into Hawaii for work on the large sugar estates of these islands. They were engaged under a contract by which they were paid from $18 to $24 a month, with a bonus of $72 at the end of three years' continuous service. Their passage was paid by their employers. In the fall of 1901 nearly all had left the islands, and those who remained had taken up other occupations. In the new environment, the negroes were disinclined to serious labor.

Efficient skilled labor is well employed in this country at wages which compare favorably with those obtaining anywhere else in the world. There would be little chance, therefore, of securing any large quota of laborers of this class for the Transvaal mines. Further difficulties might be encountered in attempting the experiment, unless the employers guaranteed a liberal measure of personal freedom and many of the privileges that accompany citizenship. The American negro of the better class is very appreciative of his importance as a citizen, and would be likely to resent any marked curtailing of the privileges which he has enjoyed in this country, if he were to live for any length of time under another government.

COST PER TON AS A BASIS OF MINE VALUATION.

BY R. GILMAN BROWN.

Hardly second in importance to the determination of value per ton, by careful and systematic sampling, is the determination of cost per ton from the mine accounts. The object of sampling has been attained when the gross valuable contents of the ore exposed in the mine have been determined. This, for the sake of convenience in subsequent calculation, is usually reduced to value per ton. From this gross value per ton must be deducted the total cost per ton and the loss per ton in treatment, the remainder being the net value per ton. Obviously an error in cost per ton is just as important as an error in gross value per ton, so that it is necessary to examine with as careful scrutiny the method of obtaining the one as of the other. Several pitfalls have been pointed out recently in the columns of this JOURNAL which will be ignored in this present article; or, rather, will be assumed to have been satisfactorily avoided, the desire being not to obscure another factor in valuation which has been touched upon but lightly, if at all.

It is not intended in the present article to go into the details of mine accounting, but it will be assumed that in some way or other the engineer has obtained certain segregated totals representing the expenditure during a certain period in the various operations connected with mining and beneficiating the ore, and that the sum total of these segregated accounts represents the total cost of operations for the period in question.

It is usual to divide these segregated totals by the tons of ore treated during the same period, and to call the quotients the cost per ton for the various departments. In a certain sense the sum of these is a cost per ton, though not properly to be considered *the* cost per ton, as the result is rather a hazy approximation representing, perhaps, average work for the mine, but not sufficiently definite to be used with confidence in the delicate work of valuing ore reserves.

Let us assume certain natural divisions of the accounts into stoping, development, reduction and general expenses. All the segregations can be easily grouped under these headings; and this would naturally be done in the process of arriving at the cost, in the manner to be described. In the inexact method commonly employed, these totals would all be divided by the same tonnage—probably by the tonnage reported from the mill or reduction works, whereas, this would only give true results for the last two items, namely, reduction and general expense. For stoping, the result might be approximate except in the case of a mine carrying a considerable amount of ore in the stopes. For development, it could only give the true value when the same amount of ore was stoped as was developed during the period. If development fell behind, the result per ton would be too little; if it exceeded the output, it would be too much.

This is the general statement of the matter, but it can be made clearer by considering a concrete case. It is proper to say that this, though based on practice, has been elaborated, with the assumption of certain values, to suit more general conditions.

The period is 12 months.

Tons treated, 50,000.

Total return per ton, $5.26.

Total loss per ton, 64c.

Total gross value per ton in ore, $5.90.

Below is given in tabulated form the costs of the various departments and the costs per ton, as commonly calculated:

	Total.	Per ton basis of tons treated.
Stoping	$58,000	$1.16
Development	50,000	1.00
Deduction	92,000	1.84
General expenses	22,000	.44
Total	$222,000	$4.44

The following tonnages are also given:

	Tons.
Ore broken in the stopes	10,000
Ore standing, blocked out, ready for breaking	100,000
Ore reasonably expected, but partly, if at all, developed	50,000
Total	160,000

These are the quantities assumed to be found by the engineer on his investigation of the property, and the recoverable value per ton will be taken at the average of the past year, which we will assume to have been determined to be the fact by careful sampling. The most natural way of calculating the value of these reserves would be as follows:

Total recoverable value of 160,000 tons, at $5.26	$841,600
Costs on 160,000 tons, at $4.44	710,400
Apparent profit in reserves	$131,200

This is manifestly incorrect. Stoping and development should not be charged against ore already broken, nor should development be charged to that standing blocked out and ready for stoping. The estimate should read as follows; assuming the figures for cost per ton to be correct:

10,000 tons broken in stopes, at $2.28 per ton for milling and general expense	$22,800
100,000 tons developed, ready for stoping, at $3.44 ($2.28 + $1.16)	344,000
50,000 tons, reasonably expected, but not developed, at $4.44	222,000
Total costs	$588,800
160,000 tons, recoverable value as above	841,600
Net profits	252,800

The cause of the great difference is obvious. It should be noted that in the accounts, transportation and handling costs are assumed to belong in general expenses. The above figures must be taken as thrown in, apart from the fundamental matter with which this article opened and they contain errors as was indicated in our opening lines.

Reduction costs and general expense are properly reduced to the per ton basis by dividing by 50,000 tons, but stoping and development cannot properly be so reduced until we know whether 50,000 properly represents the tons stoped and the tons developed. In what follows we are using some quantities that an engineer examining the property can scarcely have come at directly, and indeed he will be fortunate if he has them at all; but, recognizing their importance, by inquiry and estimate, he must arrive at some sort of a probable value for them.

We have, as a general proposition, that the actual amount of ore broken during the year is equal to the ore on hand broken at the end of the year, plus the ore treated during the year, and minus the ore on hand broken at the beginning of the year. In the same way the ore developed during the year is equal to the ore blocked out at the end of the year, plus the tons of ore broken during the year, and minus the ore standing blocked out at the beginning of the year. Applying this to our concrete case, we will assume the following values for tonnage at the beginning of the year:

	Tons.
Broken in the stopes	20,000
Standing blocked out	120,000
Reasonably expected	60,000

Ten thousand tons plus 50,000 minus 20,000, equals 40,000; which turns out to be the actual ore stoped during the year, so that the true cost of stoping per ton is 58,000 divided by 40,000, equals $1.45 per ton. In the same way 100,000 plus 40,000 minus 120,000, equals 20,000 tons, the actual ore developed during the year; and $50,000, the total spent on development divided by 20,000 tons, equals $2.50 per ton, the true cost of developing a ton of ore. Inasmuch as no costs are credited in this discussion to the ore reasonably expected, we need not carry this further, though the same reasoning would hold in regard to it. Collecting our true cost per ton we have:

Stoping	$1.45
Development	2.50
Reduction	1.84
General expense	.44
Giving the true total cost per ton at	$6.23

This shows that the ore at this mine will not actually pay expenses for handling unless greater economies can be practised; whereas, our first calculation gave a profit per ton of about 80 cents. To a certain extent, then, the matter concerns the mine manager as well as the examining engineer, though

it is in the interest of the latter in particular that this article was prepared.

Proceeding next with the valuation of ore reserves, we reproduce our earlier figures with the corrected costs introduced:

10,000 tons, broken, at $2.28 per ton	$22,800
100,000 tons, developed, ready for breaking, at $3.73 ($2.28 + $1.45) per ton	373,000
50,000 tons ore, reasonably expected, at $6.23	311,500
Total	$707,300
Recoverable value, as above	841,600
Net value on the reserves	134,300

In order to lay the whole matter more clearly open and even at the risk of being tedious, it is worth our while to make another assumption regarding tonnages at the beginning of the period, as below:

	Tons.
Broken in the stopes	None.
Standing ready for breaking	80,000

The tonnage and cost per ton follow in summary:

	Tonnage for year.	Cost per-ton.
Stoping	60,000	97c.
Development	80,000	62c.
Reduction and general expense, as before	50,000	$2.28
Total		$3.87

On this basis, the value of the ore reserves is:

10,000 tons, broken in stopes, as before	$22,800
100,000 tons, ready for stoping, at $3.25 ($2.28 + 97c.) per ton	325,000
50,000 tons ore, reasonably to be expected, at $3.87	193,500
Total charges	$541,300
The gross recoverable value, as before	841,600
Profits in reserves	300,300

The differences shown clinch the statement with which this paper opened.

As a summary of the above there are two general principles to be enunciated:

(A). Cost per ton is the quotient of total cost divided by the actual tonnage resulting from that expenditure.

(B). Net value per ton is the gross recoverable value per ton, less cost per ton for those natural divisions of the work still to be performed upon the different classes of ore.

Although the above principles are fundamental, like all general statements they may easily be pressed to extremes, and it is for the engineer, after analysis of the situation, to decide the particular extent of their application; a failure to recognize them at all on the other hand, may invalidate the conclusions drawn from otherwise reliable work.

THE ORE DEPOSITS OF CANANEA.[1]

By W. L. Austin.

In Mr. Weed's interesting paper on igneous contacts, frequent reference is made to the Cananea copper deposits, which are said to have been so vigorously exploited that they produced 140,000,000 lb. of copper in 1901.

The ore-bodies which yielded this amount of metal are described as a product of contact-metamorphism, and in Mr. Weed's genetic classification of such deposits they receive a place under the sub-heading: "Deposits impregnating and replacing beds of contact zone." They are considered by Mr. Weed to represent a special type under this head, and are further classified as: "1. Chalcopyritic deposits—(a) Pyrrhotite ores, (b) Magnetite ores, Cananea type."[2]

In condensing much information into a comparatively small space, the presentation of a subject may be so abreviated as to detract from its clearness. The situation at La Cananea, considering its importance from an economic as well as scientific standpoint, may be worthy of more detailed description. As Mr. Weed rightly remarks: "Structural differences are so important, and have so marked a bearing, not alone on the theory of their genesis, but also in the working of the deposits and a determination of their value as mines, that they merit a full discussion."[3]

It is my present purpose (1) to show that it is doubtful whether the copper of La Cananea is mined, except to a limited extent, from contact-metamorphic deposits; (2) to emphasize the importance of the mineral-bearing porphyry in connection with the genesis of the Cananea deposits, and (3) to question the correctness of Mr. Weed's opinion, that, in this locality, "the deposits should extend downward in depth to the granular rock."[4]

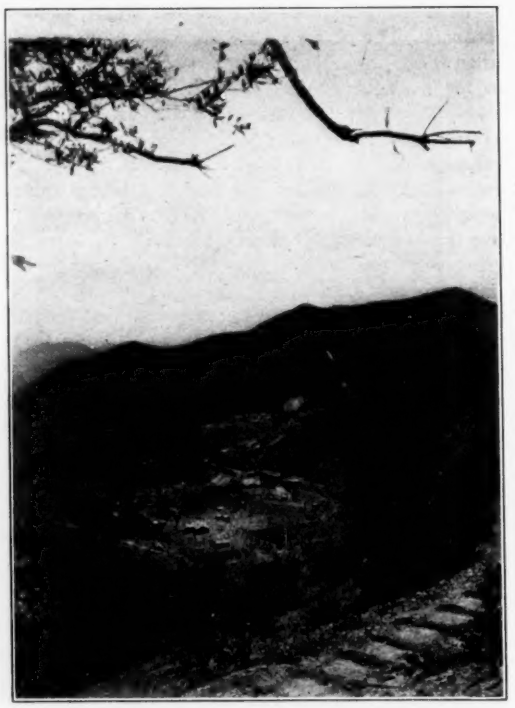


FIG. 1.—VIEW FACING CAPOTE BASIN.

Contact-metamorphic ore-deposits are very common in the west and southwest. Among the better known of those in which copper is the principal economic mineral, are those of the Seven Devils district in Idaho; Saline Valley, in California; the Planet mine on Bill Williams Fork; Marble Mountain in the Santa Catalina mountains, and Clifton, Arizona; La Cananea, and the Santo Niño deposits on the Yaqui river, Sonora; Terassas station, Chihuahua; and La Jibosa mine, Velardeña copper mine, and Sacrificio mountain, Durango. There are many others which I have not personally visited, but concerning which I have received private communications, or have found descriptions in current technical literature.

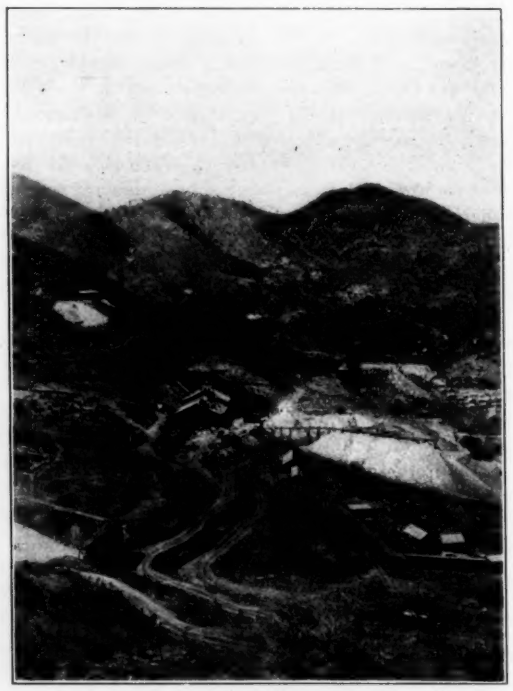


FIG. 2.—CAPOTE BASIN.

These may be all classed together, as ore-deposits occurring at or near the contact of igneous rocks with limestone beds, and owing their existence to the presence of the eruptives.

This general type of deposit is recognizable at first sight; but it is not always with a simple contact that the observer has to deal. Associated with the actual contact ore-bodies are mineralized eruptives, fissure-veins, and replacements in the limestone. Mr. Weed, recognizing the variations displayed by the deposits of this description, has prepared a tentative classification, which might be further discussed to advantage.

By reason of the very nature of the genesis of these deposits, there must be much diversity among them. In fact, hardly any two of them are exactly alike. They all have a certain mutual resemblance and differ radically from any other class; but unless a broad significance is given to the term contact-metamorphism, it will scarcely cover them all, and in any event, there will be almost as many "types" as deposits.

The selection of the Cananea deposits as typical of contact-metaphorism, and the ascription to this type of the large production of copper quoted above, seems to me to be ill-advised; and the statement, that in this instance the primary sulphide-ore should continue of unchanged tenor in depth down to a hypothetical contact with granular work, certainly calls for further elucidation.

There are numerous contacts between the limestone and the igneous rocks of Cananea district; in fact, all the limestone patches are almost surrounded by phorphyritic rock of one kind or another; but neither at any one of the important mines—nor at any other points so far as known—has a contact between the limestone and a granular igneous rock been observed.

The ore deposits of *La Sierra de la Cananea*, as hitherto developed, are scattered through the mountains along a NW-SE belt for about eight miles. Puertocito is at the extreme northern end of the belt; the Elisa mine at about the middle; Capote Basin (with the Capote, Oversight, Veta Grande, and Chivatera mines) south of the Elisa; while the southern end is taken up by the Cobre Grande mine. The Elenita deposits are really a part of Puertocito. At various points between these main ore-bodies are smaller ones.

At Puertocito and Elenita there are masses of garnetiferous minerals with associated copper carbonates and silicates, pyrite, chalcopyrite, and bornite; at the Elisa there are irregular bodies of chalcopyrite along a fault-fissure in the metamorphosed limestone; at the Oversight and Capote mines there are much larger masses of feldspathic porphyry carrying chalcocite, which have yielded much the greater part of the copper produced in the district. The deposits of Elenita and Puertocito had no part in the large copper production mentioned in Mr. Weed's paper; not until late in April, 1903, was any ore shipped from this part of the belt.

At the present time (April, 1903), the Oversight mine occupies the place of honor among the developed properties, having temporarily exceeded the production of the Capote, which was the first large *bonanza* found in the district. The first-class ore of the Oversight is a soft, white feldspathic porphyry, heavily mineralized with chalcocite. At the southern end of the mine, the surface indications of underlying ore-bodies are so light that one, not familiar with the characteristics of deposits of this class, would hardly have ventured to predict the discoveries which have been made a few feet below. The porphyry shows at the top no mineralization, no gossan, no "copper stains." The solutions, which effected the decomposition of the original

[1]To be published in the *Transactions* of the American Institute of Mining Engineers, under title of "'Ore Deposits Near Igneous Contacts.' By W. L. Austin, New York City. A discussion of the paper under this title presented at the New Haven meeting of the American Institute of Mining Engineers. October, 1902. By Walter Harvey Weed, Washington, D. C."
Printed by permission of the Council, in advance of its publication by the Institute.

[2]Mr. Weed's paper, p. 7 of pamphlet edition.

[3]Mr. Weed's paper, p. 10 of pamphlet edition.

[4]Mr. Weed's paper, p. 32 of pamphlet edition.

pyrite, carried the iron with them and deposited it elsewhere, a process which can be seen in operation to-day in other parts of the district. In such cases silica and silicates are usually substituted for the minerals removed.

Underneath there is an ore-body of irregular shape, already developed for several hundred feet in depth, and in places several hundred feet wide. It is in reality a southerly continuation of the Capote ore-zone—a second great concentration of chalcocite in the porphyry. Its limits, as here stated, are merely those of the ore rich enough to be shipped; in fact, the chalcocite-bearing rock merges into cupriferous pyrite bodies, of very much larger dimensions but of lower grade. This much is known; but what is the extent of these ore-bodies, or how many more of them there may be, has not yet been ascertained. Only the first-class and the higher grades of the second-class ore, are at present taken out; lower-grade material is left standing.

It is not my present intention to discuss the extent and value of the Cananea ore-bodies. That matter has been briefly touched upon only in order to bring out the fact, that by far the greater part of the copper produced by the mines of La Cananea has come from masses of mineralized porphyry, and not from "chalcopyrite ore-bodies carrying accessory galena, practically confined to the rocks resulting from the alteration of impure limestone."[5] A statement of this kind, coming from such an authority as Mr. Weed, might possibly cause others to feel warranted in making large expenditures upon deposits of the class indicated, basing their hopes on the supposition that the *bonanzas* of La Cananea were found in contact-metamorphic deposits, with a probability of their extending "downward in depth to the granular rock."

Porphyry is by far the predominating rock along the Cananea ore-belt. I use the term 'porphyry' in a general sense, for there are several varieties. Possibly they all had their origin in the same eruptive magma, the sub-species being due to magmatic differentiation, or to the incorporation of portions of other rocks with which the eruptions came into contact. In places we find typical quartz-porphyry; but where the ore-bodies occur, the quartz is not so much in evidence. There are, in the district, other varieties of igneous rocks, such as granite, diorite, diabase, and andesite; but these are mostly at some distance from the ore-belt, and, so far as I know, not mineralized to any noticeable degree. The porphyry, however, wherever it has been artificially exposed within the entire length of eight miles here in question, is more or less pyritic, and in places the sulphides are massed so as to form ore-bodies. The mineral belt has been extensively prospected, and tunnels many hundreds of feet in length cross its trend in a number of places. In these tunnels, many of which are considerable distances away from the producing mines, this mineralized porphyry is exposed, and at such points its character can be studied to advantage. It extends from the mines on the extreme north to those on the extreme south, and is essentially the mineral-bearer of the district. The limestone occurs only in spots. Where the heavily mineralized porphyry has come into contact with the limestone there are the usual contact-metamorphic phenomena; but these ore-bodies are of subordinate commercial importance, in fact, but for the mineralized porphyry the history of La Cananea would have been entirely different.

The quartzites do not contain mineral deposits, except where cupriferous solutions from the decomposing porphyry have found cracks and fissures in which to deposit their burden; and these are practically a negligible quantity.

Where the limestone has been metamorphosed by contact with the porphyries, it has become one of the most, if not the most, resistant of the rocks of the district. Proof of this statement is furnished by the garnetiferous bluffs which constitute such prominent landmarks at the Puertocito end of the belt. Not in this district only, but everywhere, such resistance to weathering is characteristic of rocks thus metamorphosed; for the process itself is largely one of silicification.

The ore-bodies which have made La Cananea famous are soft porphyritic masses, partly of mineralized porphyry, partly of dark-colored plastic clay less heavily charged with copper-ore. The one merges insensibly into the other, and much of the material is of a nondescript character, depending on the degree of decomposition which the rock has undergone. It bears no resemblance to metamorphosed limestone, although fragments of that rock are found in it, as are also masses of quartzite.

It is common where porphyritic flows have broken through limestone beds, to find included masses of the latter caught in and surrounded by the porphyry, and the Cananea deposits are no exception.

The ore is so soft that no amount of timbering can hold the workings open; the stopes have to be filled as soon as the ore is removed. The ground swells to such an extent that on the third level of the deep Capote workings, the shaft can be kept open only by maintaining a passage-way around it. In the bottom of the mine, the top, sides and bottom, are squeezed together like those of a tunnel run into a bank of plastic clay. One peculiarity of the low-grade ore-bodies is, that although the rock may have lost its pristine character and may be as soft as stiff putty, the pyrite distributed through it is unoxidized and bright, even on its surface.

The ore from the Capote and Oversight mines comes to the concentrater and smelter mostly as whitish-gray clayed "fines." In the concentrator the Oversight ore, in particular, gives trouble, because it "thickens" the water, thereby preventing the mineral from separating out. On the concentrating-tables garnets, and similar minerals characteristic of contact-metamorphism, are noticeably inconspicuous. At Puertocito the mineralized porphyry taken from one of the shafts slacks in the air and falls to a powder.

The white feldspathic porphyry, similar to, if not identical with, that of *La Sierra de la Cananea,* may be itself a bright, cuperiferous mineral-bearer, as is evidenced by the deposits at Ajo in southern Arizona, not far northwest of La Cananea. Here masses of mineralized porphyry form hills within a basin or other eruptive matter. The rock is pyritic throughout, and in places the ore is identical with that of the Capote basin. No sedimentary rocks were noticed at Ajo by the writer. The ore-bodies are porphyry, carrying pyrite, with chalcocite and other cupriferous minerals.

At Clifton also, notably on Metcalf hill, the mineralized porphyry, constituting the ore-bodies of the Arizona Copper Company, is of similar nature, if not the same as that of Ajo and La Cananea. The same may be said of the rock in which lies the large pyritic body of Iron Mountain in California.

For the reasons above given, and without wishing to disparage the statements of such an eminent and accomplished geologist as Mr. Weed, the writer questions the propriety of describing the large copper-producing ore-bodies of La Cananea as a type of contact-metamorphic deposits. The porphyries have certainly taken a more important part in the genesis of these cupriferous deposits than that which he has assigned to them, at Puertocito, as well as in the Capote basin. It would seem to be more in accord with the facts as we find them, to assume that the pyritic minerals brought up by the porphyry became, through magmatic differentiation more concentrated in certain localities than in others, and that these heavy mineralized portions were very susceptible to attack from atmospheric waters. In the Capote basin, where the mineralization was the greatest, the porphyry yielded readily to decay, the result being the formation of ferric masses (gossan) which were left on or near the surface, and the concentration of the copper below in the form of chalcocite. The gossan found on the top of the ground is a fairly good flux, and is used as such; but it becomes more and more siliceous with depth; until it rests on the ore. It presents an irregular bottom-limit, penetrating the ore in places. Immediately under the gossan comes the chalcocite-bearing porphyry. At the junction of the two, native silver is sometimes found. The workings in this portion of the Capote mine were very hot; and the more it was attempted to ventilate them, the hotter they became. Quartz-sand (used for building purposes) was also found in this zone.

The subject of the formation of chalcocite ore-bodies by the oxidation of pyritic minerals and subsequent precipitation of the copper sulphides on deeper-lying, unaltered ore, has been handled in such a masterly manner by Mr. H. V. Winchell, of Butte,[6] that it would be superfluous to go further into the matter here.

There are contact-metamorphic deposits at La Cananea; but they were of comparatively subordinate importance in connection with the output of copper in 1901, and they are still subordinate. The main ore-deposits are concentrations in the porphyry of chalcocite derived from cupriferous pyrite, which came up as an accessory component of the original rock. A correct diagnosis of the genesis of an ore-deposit is of more than scientific interest; it is of great economic importance. A better appreciation of this truism by those in responsible charge of mining operations would result in the saving of vast sums of money at present uselessly expended.

In regard to the occurrence of arseno-pyrite in, or close to, contact-metamorphic deposits, the case of Sacrificio Mountain, Durango, might be cited in addition to those mentioned by Mr. Weed. These deposits, which are typically contact-metamorphic in the sense given the term by Mr. Weed, "zones of altered sediments about igneous intrusions,"[7] are asociated with veins of arseno-pyrite.

CEMENT MANUFACTURE IN KANSAS.—Stimulated by the success of the Iola Portland Cement Co., great interest has been developed in the manufacture of Portland cement in the natural gas field of Kansas. Several new plants are to be erected immediately—one at Iola, two at Independence, while others are talked of. The conditions are extremely favorable to cheap manufacture, suitable clay and limestone being obtainable at low cost in the same fields as the gas, which serves as fuel in the burning. It is claimed that a barrel of cement can be produced for 35 or 40 cents, while it fetches $1.65@ $2.00 f. o. b. works. The use of cement in structural work is increasing so rapidly that there appears to be a ready market for all that can be made.

PETROLEUM IN KANSAS.—The new pipe-line of the Prairie Gas and Oil Co. (Standard), from Neodesha southward to Bartlesville, I. T., is nearly completed. This is a 6-in. line about 56 miles long. It will afford a market for the oil that has been developed in the vicinity of Independence and southward, and will greatly stimulate further prospecting. In the meanwhile the capacity of the refinery at Neodesha is being increased from about 2,000 barrels per day to about 4,000 barrels. There is already a pipe-line from the Chanute field to Neodesha. The outlook is for a considerably increased petroleum production in Kansas, especially in the district southwest of Independence, and in the Indian Territory.

The theoretical water-power of the world has been thus roughly computed by John Clarke Hawkshaw, president of the Institution of Civil Engineers: Assume a depth of 10 ins. of rainfall to ow off each square inch of land surface, the mean height of which may be taken as 2,250 ft. above sea level. Then the water from the whole surface falling through the mean height would give 10,340,000,000 horse-power in perpetuity. Our present yearly output of 225,000,000 tons of coal would give that horse-power for only a little over half a day.

[5] Mr. Weed's paper, p. 9 of pamphlet edition.

[6] ENGINEERING AND MINING JOURNAL, Vol. LXXV., p. 782.

[7] Mr. Weed's paper, p. 7 of pamphlet edition.

VOLATILIZATION OF METALS AS CHLORIDES.

By STUART CROASDALE.

It is a well known fact that many of the metals can be volatilized as chlorides when heated in a current of muriatic acid or chlorine gas. This paper relates only to the volatilization of metals as chlorides from their ores during what is termed a chloridizing roast, or the roasting of ores with salt and sulphur in an oxidizing atmosphere.

The chloridizing roast has been in use for a long time for the treatment of silver ores preparatory to leaching with "hyposulphite" or salt solutions, or to pan amalgamation. It has also been in use a long time on low grade copper ores preparatory to leaching with water to extract the copper. In connection with these operations it has been noticed that the loss of gold by volatilization is so great that the use of this method is made prohibitory on ores containing appreciable quantities of that metal. The loss of silver has varied from 2 to 25 per cent, depending upon the temperature and method of roasting and the presence of other volatile chlorides. The volatilization of the base metals has been but little studied. Their presence in small quantities in dry silver ores is accepted as a necessary evil, and in chloridizing the ores of copper the loss of that metal is reduced to a minimum by careful roasting. In short, all the energy expended on this branch of metallurgy has been in efforts to prevent losses by volatilization.

During my connection with the Holden Lixiviation Works at Aspen, Colo., from 1891 to 1893, I had opportunity to study the volatilization of silver and lead in the chloridizing roast with a Stetefeldt furnace. It was also my fortune while there to conduct the original experiments on barrel chlorination for Cripple Creek ores. During the course of these experiments I had occasion to notice the volatilization of gold when subjected to a chloridizing roast, the details of which will be mentioned later. Circumstances prevented further work in this line until 1896, when, in conjunction with Mr. Edwin C. Pohle, who had also done some preliminary work in this line, we conducted a systematic series of experiments to determine the extent to which metals could be volatilized by a chloridizing roast. These experiments have since been continued on a large scale by myself, together with Mr. E. N. Hawkins and others interested in the commercial development of these reactions. The ease with which the metals referred to seemed to take a gaseous form indicated that this branch of metallurgy along the old lines was in opposition to the laws of nature, and that the proper course would be to let nature have her own way and volatilize all the metals as chlorides and then collect them from the fumes, thereby eliminating the cost of treating the ores after roasting.

These early experiments were conducted in the muffle of an assay furnace. The charges consisted of 50 to 100 grams of ore with the requisite amounts of salt and sulphur which were charged at once into a temperature of about 1000° C., either in a roasting dish or on the floor of the muffle. Chemical action began almost immediately and fumes began to come off. During the first part of the roast the ore was frequently rabbled to break up the loose crust that formed. After that there was seldom any tendency to form lumps unless the character of the ore made it easily fusible.

In all experiments the ore was carefully weighed before and after roasting and the necessary corrections were made in the assays to render the results comparable.

The experiments on gold ores are given somewhat in detail, since they were of a preliminary nature and formed a basis for subsequent work on other metals.

Gold.—Of all the metals tested this seemed to be the most readily volatilized, with a possible exception of lead. This is best illustrated by the original experiment to which reference has already been made. For roasting Cripple Creek ores I had a furnace that would hold a charge of 200 lb. During the course of the chlorination experiments it was desired to do some experimental work on chloridizing silver ores by roasting with salt, which was done in this furnace.

On resuming the chlorination experiments, the furnace was carefully scraped out and a charge of Cripple Creek ore put in. After roasting it was found to have lost over 50 per cent of the gold. The next charge lost over 25 per cent of the gold. This was accomplished by the salt remaining in the hearth of the furnace, or perhaps not more than a quarter of a pound for the 200 pounds of ore. When the furnace was re-lined there was no loss of gold on roasting subsequent charges of ore.

While this confirms the experience of Aaron and others, I mention it to show the ease with which gold is volatilized. The following experiments were made on a Cripple Creek ore having the following value and approximate composition:

Gold	2.14 oz. per ton.	
Sulphur	1.30 per cent.	
Silica	55 per cent.	approx.
Alumina	30 per cent.	approx.

Experiment A—Salt Variation.—Additional sulphur was used in the form of pyrite, making the total sulphur 3.2 per cent.

Per cent. salt used.	Assay roasted ore, oz.	Per cent. volatilization.
5	0.10	95.1
10	0.06	97.2
15	0.05	97.7
20	0.04	98.1
25	0.02	99.0

Experiment B—Sulphur Variation.—Ten per cent salt giving good results, that amount was used as a common quantity for the sulphur variation, which was as follows:

Per cent. total sulphur.	Assay roasted ore, oz.	Per cent. volatilization.
1.3	0.04	98.1
2.3	0.026	98.8
3.2	0.06	97.2
5.2	0.72	66.3
7.2	0.84	60.7
9.1	1.20	43.9

These two series of experiments show very clearly the necessary relation of salt to sulphur, which is 10 per cent salt to 2.3 per cent (or 2.5 per cent) sulphur, or the following chemical reaction:

$$2NaCl + S + 2O_2 = Na_2SO_4 + Cl_2$$

It will be shown later that these compounds also bear a direct relation to the volatile base metals in the ore. With gold and silver ores the theoretical amounts of salt and sulphur necessary to combine with these metals to form chlorides would be so small that it would be impossible, in a roasting operation; to secure physical contact of all the particles with each other, in order to obtain a complete chemical reaction. For this reason it was found necessary to use an excess of the theoretical amounts of both salt and sulphur where gold and silver are the only volatile metals in the ore.

Experiment C—Time Variation.—Using the above ratio for the salt and sulphur, the rate of volatilization for gold was determined as follows:

Time of roast, minutes.	Assay roasted ore, oz.	Per cent. volatilization.
10	0.97	54.7
20	0.34	84.1
30	0.21	90.0
40	0.08	96.2
50	0.06	97.2
60	0.05	97.7

It is well known that chloride of gold decomposes at a temperature far below the temperature at which it was volatilized in these experiments (about 1000° C.), yet there can be but little doubt that it was volatilized as a chloride or possibly as a double chloride with the sodium. At what point decomposition takes place is uncertain, but subsequent experiments on a larger scale (in plants treating ore by the ton) have revealed the fact that both in the dry fumes deposited in the flues near the furnace and in the fumes condensed by water 100 ft. from the furnace the gold occurs in metallic form, totally insoluble in water or in the acidified condensing solutions.

The ore used in these experiments varied from 80 to 20 mesh in size.

The following table shows the volatilization of gold from different ores. Those marked with a * were lots of a ton or more treated in a reverberatory or White-Howell furnace.

Locality.	Character of Ore.	Oz. Gold per Ton Raw Ore.	Oz. Gold Per Ton Roasted Ore.	Per cent Volatilization.
Cripple Creek, Colo.	Silica and alumina.	0.72	0.04	94.4
*Cripple Creek	Silica and alumina.	1.25	0.08	93.6
Georgia	Iron pyrite	1.28	0.06	95.3
Nevada	Oxidized arsenical.	0.68	0.01	98.7
British Columbia	Sulphide arsenical.	3.34	0.02	99.4
New Mexico	Iron pyrite	0.40	0.08	80.0
Utah	Iron pyrite	0.60	0.10	83.3
*Boulder Co., Colo.	Iron pyrite	0.40	0.04	90.0
Montana	Mixture of ores	1.02	0.04	96.1
*Utah	Siliceous lime	0.22	0.02	90.9
Utah	Siliceous lime	0.48	0.01	97.9
Mexico	Siliceous lime	1.00	0.06	94.0

Silver.—The chloridization of silver in ores by means of salt is, perhaps, one of the oldest of metallurgical processes. It is sometimes done in the wet way on the raw ore and at other times it is done by the chloridizing roast. The latter method is treated extensively in Stetefeldt's "Lixiviation of Silver Ores," second edition, which is largely a record of the work done at the Holden mill, at Aspen, Colo., during my connection with that company. Hoffman has also published[1] a record of most careful experiments on this subject. Both of these contributions treat of the efforts to effect chloridization with the least possible volatilization of the silver.

At the Holden mill a Stetefeldt furnace was used, in which not more than 40 per cent of the silver was chloridized, owing to the short exposure to the heat, but the oxidation of the pyrite was effected so that when the ore was drawn from the furnace and piled on the cooling floor the chemical action continued for several days, chloridizing an additional 30 to 40 per cent of the silver.

Hoffman used reverberatory and Bruckner furnaces and found that when insufficient air was admitted to the furnace the chloridization was not good and the loss of silver was increased.

My experiments were confined to higher temperatures and an effort to secure a high volatilization of the silver. This was best accomplished by admitting an *excess* of air to the roasting ore, and increasing its effect by constantly rabbling the ore, or otherwise exposing a fresh surface to the atmosphere.

My theory of this is that when a particle of salt comes in contact with a particle of sulphide of silver under these conditions (plenty of air and high temperature), the chemical action is not only very rapid but the temperature is sufficiently high to volatilize the chloride of silver as soon as it is formed, instead of allowing it to melt, thus leaving a fresh surface of the sulphide continually exposed until it is all volatilized.

Other chlorides, such as those of the base metals, or extra salt assist in the volatilization of silver chloride.

Silver occurs in the fume as the chloride or subchloride, which is totally insoluble in water.

To secure good results, silver ores require finer crushing than any of the ores of the other metals. Even with the same general character of ores the results are sometimes irregular under the same treatment. The cause of this has not been thoroughly investigated, but since antimony was found to exert a notable action against the volatilization of silver, I attribute most of the trouble in such ores to antimonial silver compounds.

The following list shows the effect of the chloridizing roast on the so-called "dry" silver ores. The lead-silver, copper-silver and gold-silver ores are given under "Complex Ores":

Locality.	Character of ore.	Oz. silver per ton raw ore.	Oz. silver per ton roasted ore.	Per cent. volatilization.
Montana	Siliceous	10.0	1.9	81.0
Mexico	Siliceous	26.0	2.1	91.9
Mexico	Siliceous mixture.	27.5	1.0	96.4
Mexico	Siliceous	27,0	3.1	88.5
Mexico	Siliceous	101.44	18.3	81.9
Nevada	Siliceous	25.9	1.6	93.8
Nevada	Siliceous	156.0	10.6	93.2
Colorado	Lime and baryta	234.0	2.3	99.0
Colorado	Silica and talc	19.0	0.9	95.3
Utah	Siliceous	186.0	30.9	83.9

[1] "Mineral Industry," 1896.

Copper.—As already stated, copper ores are sometimes chloridized for leaching, particularly the low-grade cupriferous pyrite in which the iron oxide residues are utilized. The losses of copper chloride by volatilization are kept at a minimum by low temperature, but actual experiments have shown that even at a dull red heat the copper is slowly volatilized. The salt and sulphur bear a direct relation to the copper as well as to each other, and the proportions may be represented by the following reaction:

$$CuS + 2\ NaCl + 2O_2 = CuCl_2 + Na_2SO_4$$

or, in other words, for each per cent. of copper approximately one-half of one per cent. sulphur and two per cent. salt are required to volatilize it from the ore. Owing to the imperfect contact obtained by a dry mixture of this kind, a slight excess of salt is required to overcome loss of that compound by volatilization without decomposition. A slight excess of sulphur is also desirable for the same reason and also for the purpose of rendering the condensing solutions acid, as will be explained later.

The time required for a laboratory test is usually from two to three hours. This apparent slowness as compared with gold may be due to the vastly increased percentage of metal to be volatilized over the percentage of gold in an ore, as well as to the different properties of the two chlorides.

The copper salt formed first is probably cupric chloride. A large portion of this is changed by the heat into cuprous chloride or into the basic or oxychloride, or both. The fume, after exposure to the air, has the characteristic yellowish green color and only a portion of it is soluble in water, but it is readily and completely soluble in dilute acids.

The occurrence of copper in ores affects, to some extent, its volatilization. Carbonates, oxides and silicates volatilize readily by adding the theoretical amount of sulphur, as iron pyrite, together with the requisite amount of salt. Chalcopyrite, bornite and the normal sulphides volatilize readily. When they occur with iron pyrite or the sulphides of other base metals, the sulphur may be reduced by a preliminary roast to the amount necessary to form the normal sulphide of copper and the chloridizing roast is then made, volatilizing practically all the copper. More than this, the ore may be roasted sweet and the chloridizing roast made by adding the theoretical amount of sulphur as iron pyrite and the necessary salt, and still volatilize the copper. Sub-sulphides like chalcocite and antimonial ores, particularly the latter, leave more copper in the gangue after the chloridizing roast than any of the others that were tried.

To show the gradual volatilization of the copper in a chloridizing roast, samples were taken every four feet down the hearth of a mechanically rabbled reverberatory furnace from the point where chemical action began to the point where the highest temperature was reached, or a distance of 32 feet. The results given below represent the loss of copper:

Per cent. Cu.	Per cent. Cu.
4.61	1.76 (Cont'd)
4.26	1.70
3.93	1.68
3.85	0.38
3.12	

The following list of experiments shows the volatilization on various ores. Those marked with a * indicate tests on a ton or more of material. Copper containing gold and silver is given under complex ores:

Locality.	Character of gangue.	Copper mineral.	Per cent of copper in raw ore.	Per cent of copper in roasted ore.	Per cent volatilization.
Chile	Siliceous.	Atacamite.	4.3	0.25	94.2
Chile	Sulphide.	———	19.11	0.17	99.1
Mexico	Silica, iron, lime, zinc.	Chalcopyrite.	11.1	0.10	99.1
†Mexico	Silica, arsenical iron.	Chalcopyrite.	3.26	0.46	85.9
†Montana	Silica, iron.	Chalcocite.	9.43	0.48	94.9
†Montana	Silica, iron.	Chalcocite.	5.20	0.58	88.8
†Virginia	Siliceous.	Bornite.	6.8	0.40	94.1
Virginia	Siliceous.	Bornite.	20.3	0.72	98.7
New Mexico	Sandstone.	Carbonate.	3.1	0.00	100.0
New Mexico	Shale.	Oxidized.	16.0	0.00	100.0
New Mexico	Iron pyrite.	Chalcopyrite.	12.1	0.27	97.8
Utah	Porphyry.	Chalcopyrite.	1.7	tr.	99.9
Arizona	Siliceous.	Hydro-silicate.	10.2	0.55	94.6
†Arizona	Siliceous.	Hydro-silicate.	10.2	0.75	92.6

†No sulphur added.

Lead.—This metal seems volatile in nearly all its common forms—sulphide, sulphate, oxide and chloride. Of these the chloride is undoubtedly the most volatile. Experiments show that it can be readily volatilized by roasting with the theoretical quantities of salt and sulphur according to the following reaction, if such quantities are sufficient to provide for an intimate contact of all the particles:

$$PbS + 2\ NaCl + 2O_2 = PbCl_2 + Na_2SO_4$$

The lead fumes contain the sulphate as well as the chloride (no doubt due to the SO_3 and SO_3 in the furnace gases) and in all probability some basic salts. The composition of this fume will be mentioned under the head of "Commercial Application." Lead is readily volatilized from all its ores. Since the tests were made on ores containing other metals associated with the lead, the results will be mentioned under the head of "Complex Ores."

Zinc.—While this metal seems readily volatilized as a chloride from its ores up to a certain point, yet experiments made on zinc blende by roasting it with the theoretical amount of salt to form the normal chloride failed to produce a volatilization beyond 40 to 50 per cent of the total zinc in the ore. It is possible that further experiments on ores of this metal might produce different results.

Bismuth.—The following tests show that this metal is readily volatilized from its ores as a chloride or more probably as the basic chloride:

	Per cent bismuth in raw ore.	Per cent bismuth in roasted ore.	Per cent volatilization.
Carbonate ore	1.2	0	100
Sulphide ore	1.2	0	100

Arsenic.—Occurring as a sulphide this metal is readily volatilized with or without the chloridizing action. A test made on an oxidized arsenical gold ore volatilized the gold, leaving the arsenic behind in the gangue.

Antimony.—This has not been carefully studied, but appears to act in much the same manner as arsenic. When combined with silver and copper in ores it prevents to some extent the volatilization of those metals.

A sulphide ore containing 43.2 per cent antimony yielded 4 per cent antimony after a chloridizing roast, showing a volatilization of 90.7 per cent. A complex sulphide ore carrying copper, lead, zinc, gold and silver, and containing 1 per cent antimony, gave a volatilization of only 25 per cent of the antimony with a chloridizing roast.

Iron and aluminum show evidences of slight volatilization when subjected to the chloridizing roast. They have been found in the fumes by qualitative tests, but the actual amount volatilized has not been determined.

Complex Ores.—It was found that if a complex zinc-lead sulphide ore was desulphurized to the point where the remaining sulphur was in sufficient quantity to form the normal sulphide of lead, and then the theoretical quantity of salt added to form the normal chloride of lead and the mixture subjected to a volatilizing roast, the lead, gold and silver could be practically all volatilized without volatilizing much of the zinc, as shown by the following tests. It will be understood that these experiments were made to determine the commercial value of this reaction, and owing to the difficulty of roasting a complex sulphide to a definite amount of sulphur, the results, from a scientific standpoint, are not as perfect as they indicate they would be if theoretical proportions were strictly adhered to. A number of experiments along this line showed that while zinc volatilized in proportion to the excess of sulphur over that necessary to form the normal sulphide of lead, the temperature at which the chloridizing roast was conducted apparently had some effect on the volatilization of zinc. It was quite evident that the lead is all volatilized before any of the zinc passes off, but at higher temperature and longer time required to volatilize the silver, the zinc passes off in varying quantities from 10 to 35 per cent.

The results given on the next page show what is possible in this line, and represent the best obtained in these experiments. The separation of these metals is worthy of further study.

LEAD-ZINC SULPHIDE ORES.

Locality.	Desulphurized ore				Roasted ore				Per cent. volatilization			
	Ozs., Au.	Ozs., Ag.	Per cent, Pb.	Per cent, Zn.	Ozs., Au.	Ozs., Ag.	Per cent, Pb.	Per cent, Zn.	Au.	Ag.	Pb.	Zn.
Broken Hill, Aus.	..	36.0	38.5	25.1	..	0.7	0	22.3	..	98.1	100.	11.1
Leadville, Colo.	0.02	9.18	20.0	28.3	0	1.06	0.07	25.0	100	88.4	99.6	11.6
Leadville, Colo.	..	22.0	13.5	22.0	..	4.8	0	21.8	..	78.2	100	0.9

Since copper is readily volatilized, and nickel, belonging to the iron group, would be expected to remain in the roasted ore, an effort was made to effect a separation of these metals in the pyrrhotite ores from Sudbury, Canada. The ores were subjected to a preliminary roast to reduce the sulphur to nearly the theoretical amount necessary to form the normal sulphide of copper, and then salt was added to volatilize the copper by the chloridizing roast. Owing to the small amount of copper in the ore the proportions of salt and sulphur were both in excess of the theoretical amount for reasons already mentioned. The percentage loss of nickel seems high from the fact that the original amount in the ore was low.

Desulphurized ore.		Roasted ore.			
				Per cent, volatilization.	
Per cent, Cu.	Per cent, Ni.	Per cent, Cu.	Per cent, Ni.	Cu.	Ni.
1.13	3.27	0.42	2.83	62.8	13.4
1.23	2.68	0.46	2.34	62.6	12.7

In addition to the foregoing complex ores tested, the following list of additional types will cover almost all classes of ores in which gold, silver, lead and copper commonly occur outside of the native state. This list represents not only laboratory tests, but those marked with a * were large lots treated in the ordinary type of roasting furnace:

Commercial Application of These Reactions.—The primary object of this work was to determine the commercial value of these reactions. In no case have the tests, in lots of a ton or more of the material, failed to duplicate the results obtained in the laboratory, when like conditions were maintained in both operations.

In spite of the fact that chemical action had to take place from the mixing of dry materials (and to some extent from the action of vapors), the amounts of salt and sulphur used were remarkably close to the theoretical quantities called for by the chemical equations, except in the cases of the precious metals where it would be a physical, if not a chemical, impossibility to get an intimate contact of compounds involved.

This contact was accomplished by crushing the materials to an average size of 20 mesh, or such that would pass through a screen having 20 holes to the linear inch, with the usual size of wire. Some ores permitted coarser sizes and some required finer crushing. Siliceous silver ores, in par-

ticular, gave much better results when crushed to 40 or 60 mesh and some required an extra amount of salt to furnish sufficient volatile chloride to carry off the silver.

The amount of sulphur required in commercial operations is based on the amount necessary to form the normal sulphides of the base metals to be volatilized, but it is seldom less than 2 per cent, even when no volatile base metals are present. If gold and silver are present with the base metals, no provision is made for them in the amount of sulphur used. With zinc-lead ores no provision is made for the zinc, although some of it is volatilized.

A slight percentage of sulphur is provided in excess of the theoretical amount, in order to render the condensing solutions acid, as will be explained later, and also to provide for loss without chemical action on the salt, but this never amounts to more than 0.25 to 0.50 per cent, although a little more does no harm.

In like manner the percentage of salt required is based on the theoretical amount needed to form the normal chlorides of the base metals to be volatilized. (This necessarily brings the percentage of salt into definite relation to the percentage of sulphur required, as explained in the first part of this paper.)

The same remarks are true for salt as were applied to sulphur in reference to the presence of gold, silver, and zinc with the base metals.

The amount of salt used is seldom less than 5 per cent, and with some dry silver ores 15 to 20 per cent is necessary to furnish sufficient volatile chloride to carry off the silver.

In all cases it has been found advisable to use an excess of 15 to 20 per cent of the theoretical amount of salt to provide for the volatilization of that compound without decomposition. The ore and salt mixture is charged into the furnace at a temperature of 750° to 850° C. Chemical action begins as soon as the ore has attained the heat of the furnace, which is within a few minutes after charging. The sulphur is rapidly oxidized to SO_3 under the influence of the oxidizing atmosphere and the metallic oxides in the ore, but considerable SO_2 is also formed. The salt is in turn decomposed, forming chlorides of the volatile metals.

As soon as chemical action begins the ore increases considerably in volume and has the appearance of having been sprinkled with water. The particles adhere to each other sufficiently to prevent the formation of flue dust, which leaves the fume perfectly clean. As the volatile products are driven off the ore decreases in volume, becomes sandy and finally discharges from the furnace at a temperature of 1000° to 1100° C. in practically the same physical condition in which it was charged. The roasted ore is then void of commercial value and may be carried automatically to the waste dump.

When the ore mixture is thus exposed to a reverberated heat, with an oxidizing atmosphere passing over it, such as is obtained in a muffle, and when this action is augmented by a mechanical appliance to constantly expose fresh surfaces to the atmosphere, the volatilization of the metals is complete in one and a half to two hours.

With the possible exception of the presence of antimony, the chemical composition of the gangue has no appreciable effect on the formation and volatilization of the chlorides of the metals under consideration.

While any ordinary type of roasting furnace can be used, the one that best meets the requirements, as above described, is a revolving cylinder, 30 to 50 ft. long and with an inside diameter of 5 to 6 ft. at the discharge end. The furnace is lined with firebrick throughout and is set at a slight angle to provide for a continuous discharge of ore. Heat can be readily supplied to such a furnace so as to provide the temperatures and yet allow the oxidizing atmosphere desired. Products of combustion in no way interfere with chemical reactions of the chloridizing roast and are allowed to pass off with the fumes. The metallic values are all in the fumes. These are easily and readily collected by forcing the furnace gases through successive layers of water supported on perforated diaphragms, preferably made of textile fabrics of animal or vegetable fiber. This has not only been demonstrated by testing the waste gases, but by the actual recovery of the metals volatilized.

The condensing solutions become slightly acid from the sulphuric acid in the furnace gases, as already described. If chlorine or muriatic acid is present, its effect is not noticeable. Gold, as already stated, is recovered in metallic form, silver as a chloride, and lead as a sulphate from the acid condensing solutions. The latter is probably not all converted into the sulphate until it comes in contact with the condensing solutions. All three metals in this form are insoluble and can be readily and completely separated by filtering through paper or canvas in a filter-press. The copper chlorides seem to be converted to a large extent, if not entirely, into the sulphate and are completely dissolved by the acid solutions. The metal may be recovered by precipitation with scrap iron or electricity.

It will be seen from these experiments that much has been done to develop the practical side to the point of commercial operation. At the same time, in order to work intelligently, we have tried to keep the chemistry of the subject abreast with the commercial interest, but it is not always an easy task to arrive at definite conclusions when the chemical reactions are red hot and the resulting products are in gaseous form.

As the commercial operations increase, opportunities to observe and study will improve and much that is interesting will no doubt be developed.

Locality.	Character of gangue.	Character of mineral.	Raw or Desulphurized Ore. Ozs., Au.	Ozs., Ag.	Per cent, Pb.	Per cent, Cu.	Per cent, Sb.	Per cent, As.	Roasted ore. Ozs., Au.	Ozs., Ag.	Per cent, Pb.	Per cent, Cu.	Per cent, Sb.	Per cent, As.	Per cent. volatilization. Au.	Ag.	Pb.	Cu.	Sb.	As.
Utah & Colorado..	Siliceous.	Oxidized and pyrite.	0.65	19.7	6.25	4.5	..	..	0.02	1.05	0	tr.	..	..	96.93	94.67	100.0	100.0	..	..
Boulder Co., Colo.	Siliceous.	Tellurium.	10.16	4.0	..	..	..	..	0.38	tr.	..	..	..	..	96.20	99.99	..	..	..	..
*Jalisco, Mex.....	Siliceous.	Arsenical pyrite.	0.28	8.7	..	6.5	..	4.8	0.03	1.24	..	0.34	..	0.4	89.30	85.86	..	94.80	..	91.0
*Butte, Mont.....	Siliceous.	Pyrite, chalcocite.	..	10.6	..	9.4	..	..	..	0.80	..	0.48	..	..	..	92.4	..	94.9	..	..
*Leadville, Colo....	Silica and alumina.	Oxidized.	0.24	5.3	4.75	..	..	..	0.01	2.04	0	..	..	..	96.00	61.1	100.0	..	..	..
Huanchaca, Chili..	See Note 1.	Antimonial sulphide.	0.03	93.0	7.2	1.3	1.2	..	0	11.3	0	0.70	0.9	..	100	87.8	100.0	46.1	25.0	..
Leadville, Colo....	Iron pyrite.	Sulphide.	0.96	27.7	..	7.0	..	..	0.01	0.86	..	0.6	..	..	99.0	96.9	..	91.4	..	..
Jalisco, Mex.....	Calcareous.	Carbonate.	0.04	35.8	..	6.5	..	..	0.	1.56	..	0	..	..	100	95.6	..	100.0	..	..
Colorado	See Note 2.	Mixture.	0.72	20.5	8.4	..	..	..	0.	0.91	0	..	..	..	100	95.5	..	100.0	..	..
Tonopah, Nev.....	Siliceous.	———	1.90	156.0	..	..	..	..	0.06	6.20	..	..	..	..	96.8	96.0	..	..	..	..
Arizona	Siliceous.	Sulphides.	0.40	9.0	4.5	..	..	..	0.	0.90	0	..	..	..	100	90	100.0	..	..	..

Note 1—Analysis raw ore:

SiO_2	Fe.	Mn.	Zn.	CaO.	S.
34.6	15.9	0	22.9	0	22.9

Note 2—Smelting bed of about 3,000 tons composed of ores from Rocky Mountain region and furnace products. The analysis was as follows:

SiO_2	Fe.	Mn.	CaO.	Zn.	$BaSO_4$	S.	MgO.	Al_2O_3
28.6	13.2	1.2	5.4	5.2	1.1	4.5	2.0	11.6

BELGIUM IRON TRADE.—In the six months ending June 30, the production of pig iron in Belgium amounted to 612,970 tons, which compares with 509,790 tons in the corresponding period of 1902; showing an increase of 102,400 tons. The production this year was distributed as follows: Casting pig iron, 51,220 tons; refining pig iron, 128,620 tons, and pig steel, 432,350 tons. The output of finished iron in the six months this year was 209,560 tons, as against 189,370 tons in the same period of 1902. Open-hearth steel showed an output this year of 477,580 tons. and finished steel, 473,200 tons, both recording a substantial increase over 1902.

THE PROBLEM OF THE DRY-PLACERS.

By Henry A. Mather.

Despite the large number of the so-called dry-placer washers which have been, from time to time, invented, and actually put into service on the ground, the old Mexican riffle-board and the Indian blanket are still utilized, while most of their mechanical rivals are discarded.

While a discussion of the mode of deposition of the gold in dry-placer sands and conglomerates is more precisely a subject for the geologist, its bearing on the treatment problem will be apparent to all who have given the matter attention. Some dry-placers have a top dressing of shifting boulder-stream sands, beneath which are jagged boulders, and finally just above bed-rock rich sand and gravel, mostly cemented and hard; other placers are cemented from surface to bed-rock. This placer cement varies in its constituents; it may be composed of iron and lime only, or sometimes of alkaline earths, borates, sodium chloride, nitrate and sulphate. These cementations are generally too hard for pick and shovel; in the absence of water (and even that is not a universal solvent), blasting and crushing must be resorted to.

Most dry-placers must be systematically mined where costs are excessive, fuel being enormously expensive; where water is quickly polluted by storage, if it may be had at all in reasonable quantities; with wages and food supplies necessarily high, workmen difficultly obtainable; and last, but not least, a problem of gold recovery that has hitherto proved insuperable to mechanical means, such as have hitherto been employed.

It is doubtful if the solution of this problem lies wholly within the range of a purely mechanical apparatus, for the microscopic study of many of the "sands" indicates the failure of machines not capable of saving at least the larger portion of

30 to 50 per cent of fine flour gold in films and flakes.

30 to 10 per cent of gold precipitated on, or inclosed by, black sand.

20 to 10 per cent of gold impregnated on white sand or inclosed by cement particles.

20 to 30 per cent of coarse gold in flat or ovoid-shaped nuggets.

All mechanical placer machines are specific gravity separators. Few of the inventors have appeared to appreciate the application of specific gravity to any separation. Hence the following explanation: Specific gravity is a function of the attraction of gravitation; it is also exerted in proportion to the mass of each separate particle; thus, taking no account of shape, a particle of coarse gold dropped from a given height will fall faster than a particle of flour gold from the same height. Aside from the bulk of the particles one must consider their relative shapes, for if a round ball of gold and a flat piece of gold of equal bulk and weight be dropped at right angles to a current of air, the round ball will fall nearly straight and but slightly faster than the flat piece, while the latter will slide down the wind, so to speak, and will fall farther away in the direction the draught is moving. It is this differing action

alike with gold and gangue particles that compels one to screen or size ore particles for dry specific gravity separators.

Besides the known difficulties of using screens of the finer mesh, there are others less generally appreciated; theoretically, screening provides a simple means for the seggregation of ore particles into accurate sizes; practically, and with many ores, the screen exercises a selective action governed by shape. An oblong piece refuses a square hole which its bulk entitles it to enter. Thus some ores may be very largely concentrated by screening alone, this seggregation of mineral varying according to the cleavage planes or lines of fracture of the ore.

One might broadly state that the efficiency of most ore concentration (including dry-placer) varies in proportion to its suitability to sizing by screening. The problem of correct sizing pertains even more peculiarly to dry concentration than it does to wet methods. Air is a far lighter medium than water, hence barriers which would turn a moving current of air back on itself in eddies of nearly equal force (back pressure) would be permeated by the heavier mass of water, or these barriers would more slowly affect the source of the current. Thus air is a more elastic separating medium than water, but because it is more elastic it is more sensitive, hence sizing should be closer, if indeed there is not a better method than screening to attain this end.

Most air concentrators, whether the separation is attempted by pressure blowing or exhaust suction, are alike in the principle that sheets or veils of ore are permitted to fall through laterally moving air currents, the latter confined in a wind pipe or long closed trough. This air motion is obtained by pressure or suction blowers; those familiar with confined air currents will appreciate that the pressure exerted by a moving air current is not equal at all portions of the area of a cross-section of the confining pipe.

Mr. Edison in his machine splits up his air, equalizes its pressure, by passing it through a screen previous to impacting (so to speak) against his falling current of ore. These sized ore particles in falling describe a parabolic curve the extent of which is determined by the pressure of the wind, the height of the fall, the shape of the ore particles, and their relative specific gravities. One does not question Mr. Edison's machine may be efficacious on the class of ore for which it was designed, but all dry-placer lands do not present the same problem to separation, nor all ores to wet or dry concentration. Some one wet concentrator is always best suited to one grade of ore, so with dry-placer there can be no universally successful machine unless radical alterations are readily made to suit peculiarly differing conditions. As well ask for a universal flux in smelting!

There are more than a dozen dry-placer concentrators now on the market. Some of them asking capital to invest where "loss is impossible." The writer has examined many machines, some of which might save a portion of the coarse gold and black sand, but only one of them all appeared to be built with any comprehensive grasp of the problem involved in dry-placer working, and that machine is still in the model stage.

The successful dry-placer machine must size very accurately, and take account in the specific gravity separation of four forms of gold occurrence, it must be reasonably portable, and readily knocked down and set up; for the places where large deposits of gold sands occur are not too plentiful. For the richest dry-placers crushing and grinding machinery will be necessary, and for economical working, lifting and conveying apparatus will be advisable. The dry placer miners that expect to wring a fortune from the desert must be prepared to spend one in sensible preparation.

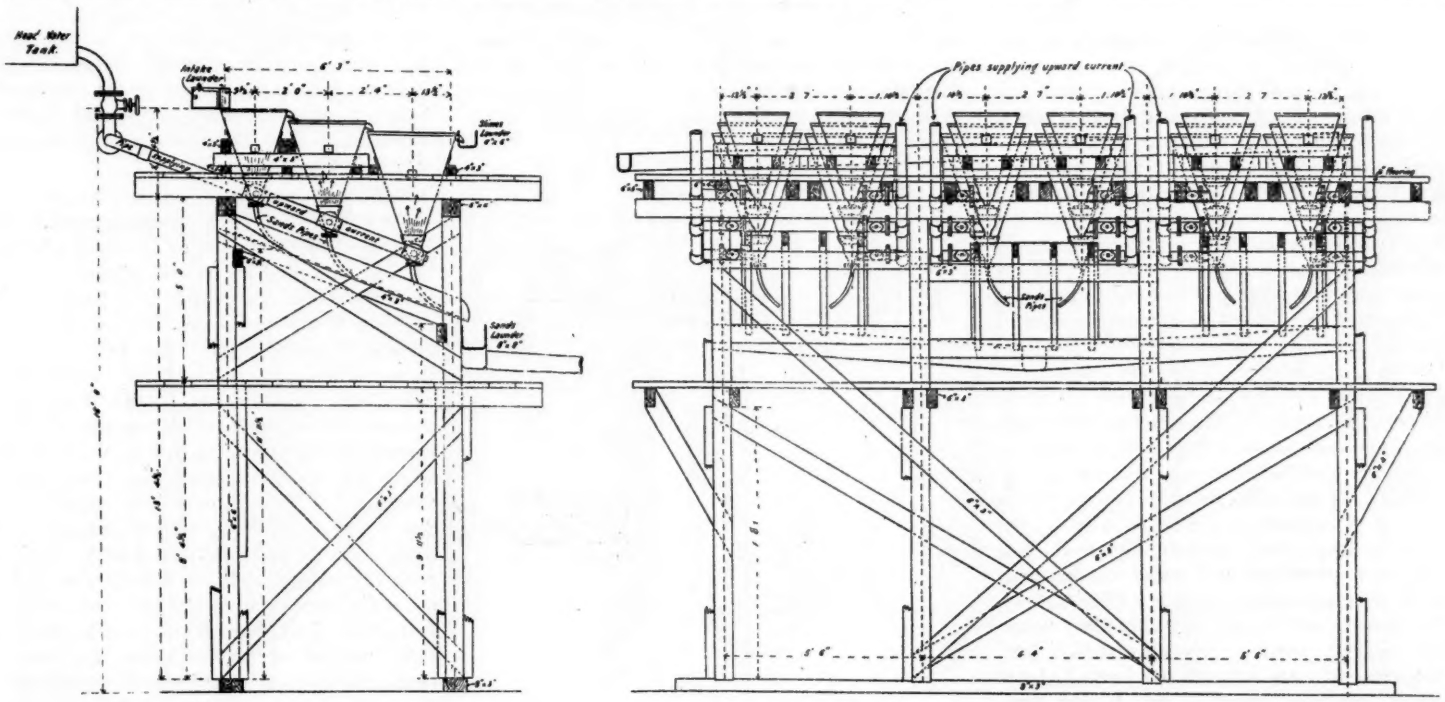


FIG. 1.—TIMBER STAND FOR SIX SERIES OF CLASSIFIERS.

THE JAPANESE METAL TRADE.—Since the Chinese-Japanese war there has been increasing industrial activity in the Kingdom of the Mikado. Credit is due the government for its progressive spirit in sending highly educated people to the leading commercial countries to investigate the prosperous industries, and subsequently in adopting many of the newly acquired ideas. Recent statistics show that the imports of iron and steel at Kobe and Osaka in 1902, chiefly from Great Britain and Germany, were valued at £849,461, among the more important articles being 20,197 tons of pig iron, 21,838 tons bar and rod iron, 14,468 tons rails, and 11,733 tons nails. There has also been imported 101 tons nickel, £37,094 worth of lead, £117,751 zinc, and £43,948 tin. Incidentally a word should be said about exports of metals, which, owing to the increasing domestic consumption, have fallen off somewhat. In 1902 the exports of refined copper amounted to 9,900 tons, valued at £532,385, part of which has come to the United States, where the metal is valued for its gold and silver content. Exports of other metals, including manufactures of copper, were valued at £202,023.

CYANIDATION AT THE KALGURLI MINE, KALGOORLIE.*

By Edwin O. Watt.

The ore, when hoisted to surface, is tipped over grizzlies above two cone rock-breakers, where it is broken to a size of about 2 ins., and falls into a bin. From this bin it is, after weighing, elevated to the treatment plant by an aerial tram 574 ft. long with an elevation of 97 ft. The dry ore is tipped into a steel bin of 300 tons capacity over six No. 5 Krupp ball mills. Provision is made for drying the damp ore through a dryer of the Howell-White type, but as most of the ore is already dry, it is seldom necessary to use it. The ore is fed automatically from the bin to the mills, which crush aproximately 25 tons per 24 hours through a screen of 40 holes to the linear inch. From the mills the ore falls direct into a distributing screw-conveyor, placed longitudinally over a steel bin of 500 tons capacity situated over the feed end of the roasting furnaces.

The ore is fed by fluted roll feeders into nine Edwards roasting furnaces. The feeders are worked from an eccentric which swings a bell crank, to which are attached four falls of unequal length working on a ratchet wheel on end of the fluted roll feeders. These last are very satisfactory, and are readily adjustable to any required tonnage. The ore falls into the furnaces, and is immediately subjected to a temperature of about 450° F., and, after passing through the roaster, discharges at a temperature of about 170° F. A combined push-conveyor and cooling floor, 4 ft. wide and 170 ft. long, conveys the ore from the furnaces to a crane and bucket elevator, which discharges into a mixer, where it is mixed with water and flows to the hydraulic classifiers designed on the mine. A working drawing of these is here shown (Fig. 1).

The purpose of these hydraulic classifiers is to separate the sand and concentrate from the slime so that the sand, after the removal of the concentrate, may be treated by percolating solutions of cyanide in the usual way, thus obviating the necessity of reducing to slime and filter-pressing the whole product, as is usually done on the Kalgoorlie field. The slime eventually passes to the filter-presses.

Each set of classifiers consists of three small inverted cones, approximately, 2 ft. 6 in., 3 ft., and 3 ft. 6 in. deep. An adjustable upflow of water is admitted

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at the bottom of each cone, and the whole pulp flowing through is subjected to the action of this gentle upflow. The heavier particles fall through this upcast of water and discharge in a steady stream from the bottom. The lighter particles or slimes overflow at top. By increasing or decreasing the upcast

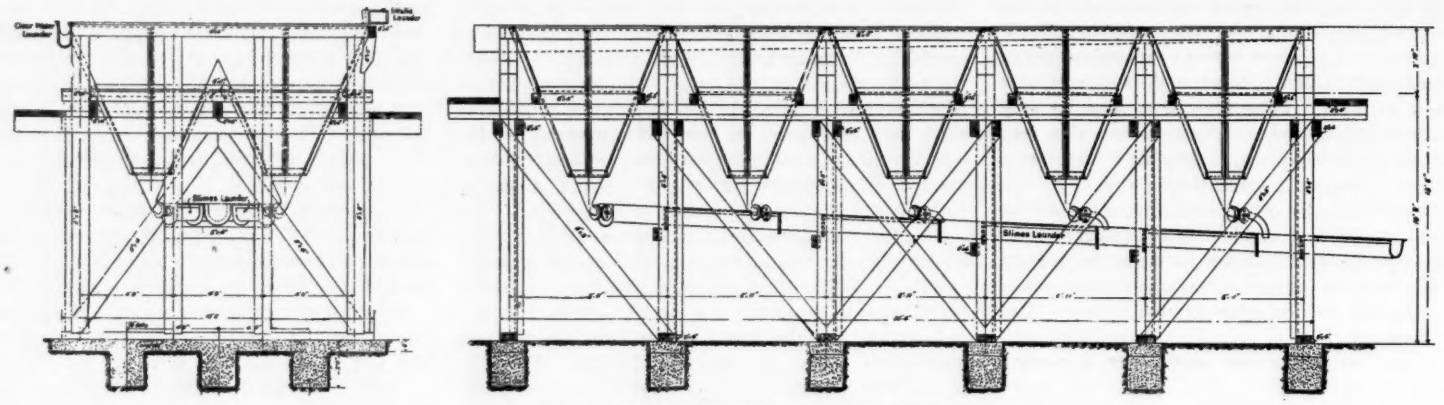


FIG. 2.—LUMBER STAND FOR FIVE SPITZLUTTEN.

a greater or smaller quantity of ore is caused to overflow.

Slime on the Kalgurli mine is taken to mean that portion of the pulp which will pass through a woven wire screen of 100 holes to the linear inch, and sand that portion which will not pass through the same screen. The pulp before separation consists of about equal portions of these products, and the gold values of each are nearly equal. Each set of classifiers will deal with over 50 tons of ore per 24 hours. They are small and light, and have no working or wearing parts. They can be made to do almost any needful classification, and they require scarcely any attention. As designed and erected, they are a most eminently satisfactory classifier, and represent the result of much experimental work. The overflow from these classifiers, consisting of about five parts of water to one of slime, is distributed through launders to five settlers, which are made of steel and measure at top 13 ft. by 6 ft. 6 in., and are 7 ft. 6 in. deep. They are shaped in longitudinal sections, like a W, and consist of two inverted pyramids joined together near the top. A diagram of these is shown (Fig. 2). In these the slime is settled, and perfectly clear water overflows at end, passing into circulation. The pulp, consisting of from 50 to 60 per cent of slime, is drawn continuously from the two bottom taps. The necessary cyanide solution is here added, and the whole flows into a filling cone above five combined pneumatic agitators and filter-press pressure tanks. From these pressure-tanks the slime, after agitation by air, is charged into filter-presses where the auriferous solution is pressed out and passes to zinc extractor-boxes. The slime, after being washed by having spent cyanide solution pumped through it to take away any dissolved gold mechanically held, is dumped.

The sand from the bottom of the classifiers passes over amalgamated copper plates, then over Halley's concentrating tables, where a small portion of concentrate is taken away.

This concentrate consists of any coarse or heavy particles and is ground to slime in a pan of the Wheeler type, and passes away with the other slime. The sand passes up an air-lift to sand-leaching vats, where it is treated by percolating cyanide solutions for about twelve days. The solutions in these vats are, when not draining off, constantly re-circulating from bottom to top by miniature air-lifts attached to the sides of the vats. As these vats are almost filled with sand, and the solutions cover the sand, it follows that as the solution equalizes in the little lift pipe, the actual lift over the side of the vat does not exceed 6 ins. A hole for the admission of the air at bottom of lift, 1-16 in. in diameter, will keep a steady flow of solution passing from bottom to top of vat. These miniature lifts not only re-circulate the solutions, but they aerate them also, and they have proved very beneficial. I would recommend the use of these aerating re-circulators for cyanidation by percolation wherever it is possible to obtain the very small amount of compressed air necessary to work them.

Air Lifts.—Air lifts are sometimes alluded to in technical works as air-lift pumps, but while they do the work of pumps, they are not pumps, because they have no working parts, and for all practical purposes no wearing parts either. A diagram of an air-lift as worked on the Kalgurli mine is here shown (Fig. 3.)

Offtake Launder
NOTE.—The ratio of A to B must not be less than 1 to 1. Preferably A should be as much greater than B as possible
B.
A
Compressed air supply pipe
Intake Launder
Water Level

FIG. 3.—AIR-LIFT FOR SANDS.

Air-lifts have been working under various conditions on the Kalgurli and Hainault mines for about twelve months. At present there are on the Kalgurli mine, in addition to the miniature lifts attached to the sand-vats, which are very small and inexpensive to work, two 8-in. and one 6-in. lifts in constant work, and on the Hainault mine one 6-in. lift taking away the products from a 10-stamp battery, but now being used only when the sand-pump is under repair. Nearly all the ore reduction works on the field are using one or more of them.

Amongst metallurgists and authorities on the field it is pretty unanimously acknowledged that, although they possess many advantages over a pump, they have proved rather expensive to work. Their efficiency on the actual steam power generated at the boilers is small; certainly not greater than has been estimated by Mr. Archibald, who introduced them into the district.

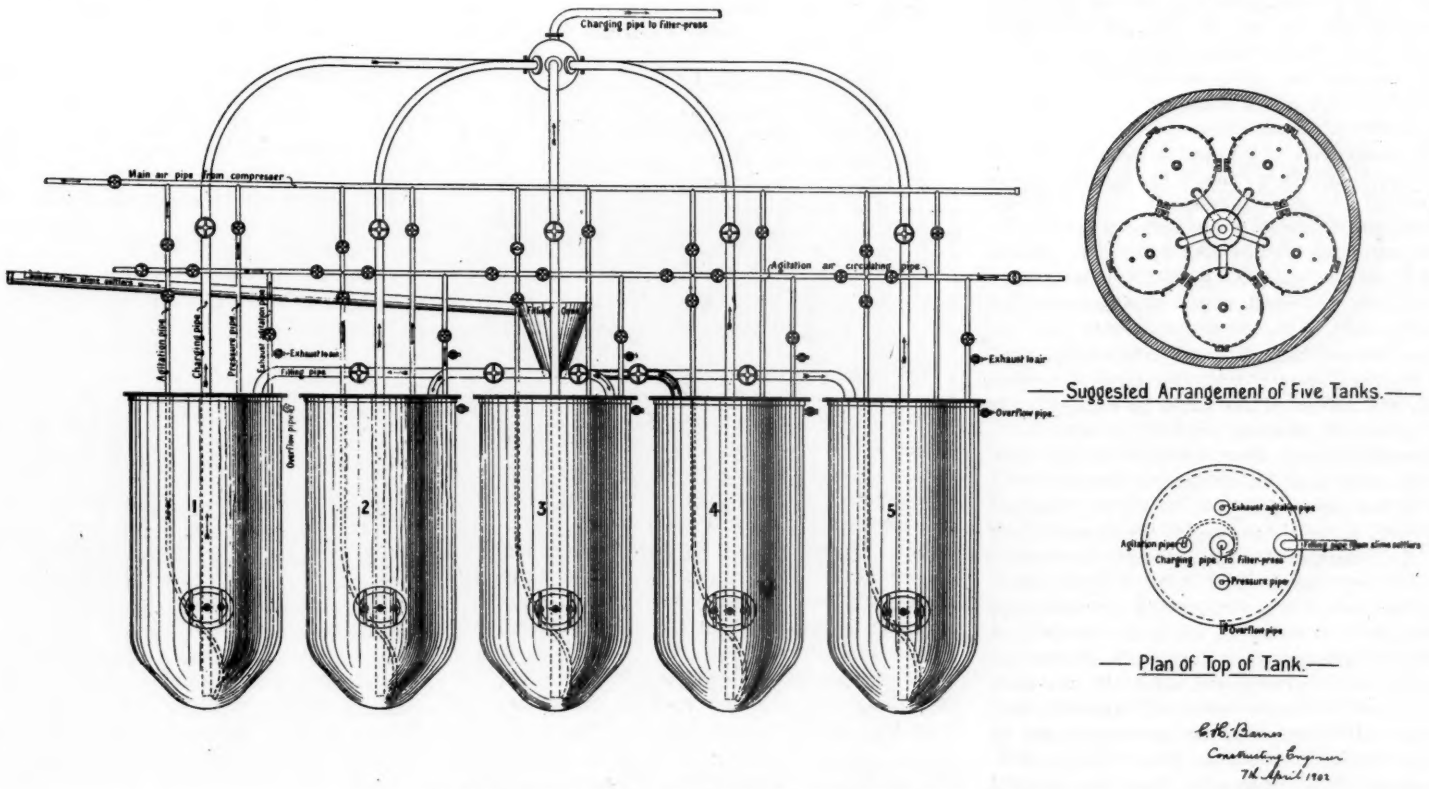
Pneumatic Agitators.—On the Kalgoorlie field the usual practice for the treatment of auriferous slime is to stir it with cyanide or bromo-cyanide solutions in steel vats with mechanical agitators for a period of from sixteen to twenty-four hours, afterwards charging it into pressure-tanks and thence to filter-presses. On the larger mines there are two exceptions to this rule, viz., on the Golden Horseshoe mine, where the slime is pumped direct into filter-presses, and cyanide solutions are afterwards pumped through at high pressure, and on the Kalgurli mine, where the slime is agitated by compresed air for three hours. It is with the latter process I wish to deal. The advisability of introducing oxygen in some form to the solutions during cyanidation is generally recognized by all metallurgists and cyanide rs, and many experiments have been made of late years with the object of obtaining a cheap and reliable method of accomplishing this end. About twelve months ago experiments were started on the Kalgurli mine with the object of determining whether or not the pressure-tanks for the charging of the filter-presses could not also be utilized with advantage as pneumatic agitators. It had been previously noted that when slime was allowed to stand in the pressure-tank and compressed air was allowed to flow through the pulp to prevent its settling, a higher percentage of gold was extracted from the slime thus treated than if it were allowed to pass directly through from the mechanical agitators to the filter-presses. Slime pulp, previously untreated by cyanide, was then allowed to run into the pressure-tanks, where cyanide solution was added, and the whole pulp gently agitated by a stream of air for five hours. Some idea of the amount of air being used for this purpose may be formed, when I say that it was about as much as would be blown from a good blacksmith's bellows. It was found that after five hours' treatment in this way the extraction of the gold contents was about 5 per cent higher than when the slime was agitated by mechanical stirring for twenty-four hours, and that the cyanide solution came away 35 per cent richer in available cyanide than was the case after stirring. The time of agitation was then reduced to three hours, and an equally good gold extraction was obtained with a somewhat smaller consumption of cyanide. After two hours' agitation the gold extraction was not so good, but further experiments showed that an equally good result could be obtained in two hours when a larger volume of air was allowed to pass through the slime. A sample of concentrated sand was then treated in the same way. Before treatment 87 per

cent of this sample remained on a screen of 110 holes to the linear inch, and the gold contents were equal to 4 oz. 17 dwt. per ton. After three hours' treatment only 34.7 per cent of the sample remained on the same screen, and the residues assayed under 3 dwt. per ton, thus showing that in three hours 32.3 per cent of the sand had been reduced to slime, and a gold extraction equal to nearly 97 per cent had been obtained. The exhaust air from the treatment of this sample came away warm in consequence of the friction generated by the sand particles grinding against each other. Subsequent grading analysis showed that this grinding action was always very marked when the pulp contained a large proportion of sand, but that, when fine separated slime was under treatment, there was only a slight diminution in the size of the particles, and under these circumstances the air came away cool. All these experiments were made on roasted sulpho-telluride ore. Experiments made with unroasted sulpho-telluride ore and potassium cyanide solutions did not give an extraction equal in any case to 60 per cent of the gold contents. The results, however, proved so satisfactory that it was decided to continue to work the process. The exhausting air smelt so strongly of cyanogen that it was realized that a still greater saving of cyanide might be effected by passing the air through a series of pressure-tanks, instead of allowing it to exhaust direct through the atmosphere. On the treatment works there were only two pressure-tanks, and it was decided to install a set of five, using the same stream of air for the series. Some alterations were made in the design of the pressure-tanks, and the necessary pipes were attached to convey the air in a continuous stream through the pulp in each tank. The accompanying diagram (Fig. 4) shows the arrangement by which the combined pneumatic agitators and filter-press pressure-tanks are being worked at present on the Kalgurli mine. For the sake of clearness of illustration, the set is shown in a straight line, but they are really being worked in a circular pit, as shown in the smaller diagram on the right hand. Each agitator is 6 ft. 6 ins. in diameter and 13 ft. 6 ins. deep, and is usually charged with about 6 tons of slime in a cyanide solution of 0.10 per cent of available potassium cyanide. After agitating for three hours the circulating air is shut off and the high pressure air is turned on to the top of the pulp. This drives the slime up the filter-press charging pipe into filter-presses, where, as previously explained, the auriferous cyanide solutions are recovered from the pulp. After discharging the slime from the agitators the tank remains full of compressed air at a pressure of about 30 lbs. per square inch. Instead of being allowed to blow into the atmosphere, as is usual under these circumstances, the air is used for discharging another agitator, or is allowed to circulate for agitation until it falls below the pressure required for that purpose. The air pressure required to agitate one agitator is about 3¼ lbs. per square inch, and for five agitators about 22 lbs., but this pressure varies slightly according to the consistency of the pulp.

For charging filter-presses it is not convenient to work with an air pressure much under 30 lbs. per square inch, for, although it was found that a pressure of 10 lbs. would charge a 5-ton filter-press full, it took nearly an hour to do it, whereas a pressure of 30 lbs. per square inch will charge a 5-ton press in ten minutes. An experiment made with the present set of five pneumatic agitators may prove of interest to metallurgists. The agitators were charged with approximately 6 tons of ordinary slime in a solution of 0.10 per cent of available potassium cyanide, and the usual stream of air was passed through for three hours. A sample of the solution was then taken from each agitator. No. 1 agitator, which first received the air, indicated .060 per cent; No. 2, .100 per cent; No. 3, .115 per cent; No. 4, .115 per cent, and No. 5, from which the air exhausted into the atmosphere, .060 per cent of available potassium cyanide.

This experiment showed that in two of the series there was an actual increase in the amount of cyanogen in the solution, due to the volatile cyanogen passing over from the preceding agitators. The results of this experiment have been confirmed by other tests made on the Kalgurli mine and by laboratory tests made on other mines on the fields. When the Kalgurli mine agitated the slimes by mechanical stirrers for 24 hours it cost about 2¼ lb. of potassium cyanide per ton to obtain a good extraction. With the present pneumatic agitators the consumption of potassium cyanide has fallen to about 1 lb. per ton and the extractions are better.

The composition of the ore is practically the same, and the consumption of potassium cyanide on the separated sands has not varied. While I am of the opinion that the introduction of compressed air to the pulp in this way is beneficial in consequence of the fact that it oxidizes the cyanide solutions, I think that the beneficial action is more largely due to mechanical than to chemical causes, as instanced by the great attrition that takes place by the ore particles rubbing against each other, especially when these particles are not already in a very fine state of division. By reference to the diagram it will be seen that the agitation pipe is peculiarly bent, so as to give a violent rotary movement to the pulp. This, combined with the action caused by the surging of the air through the material, causes the particles to rub heavily against each other; the larger particles are thus worn away and the gold is cleaned and burnished, and thus rendered readily amenable to dissolution in cyanide solutions. This process of agitation has now been at work on the Kalgurli mine for ten months, and has been subjected to severe tests, and has not failed. Its originality consists only in the method by which the air is admitted and used. The number of pipes and valves over the agitators appears at first glance somewhat complicated; but in actual practice it has not been found to be so, and the management have not experienced any difficulty in getting the attendants to understand the arrangements after a few minutes explanation. No time has been lost by any fault of the arrangement, and no part of the plant has shown any perceptible wear.[1]



PNEUMATIC AGITATION AND FILTER-PRESS PRESSURE TANKS.

COAL MINING IN FRANCE.—In the Departments of the Nord and Pas-de-Calais the production of coal in the six months ending June 30 amounted to 11,283,437 tons, which compared with same time last year shows an increase of 954,061 tons. Mining was most active in the Pas-de-Calais, although the Nord also showed considerable activity.

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[1]In the subsequent discussion Mr. E. J. Horwood stated that his experience with air-lifts at Broken Hill had been unsatisfactory. Mr. Watt, himself, did not advocate their use. He also added that the recirculation of solutions was advisable because a solution charged with gold was a stronger solvent for gold than that which contained none.—EDITOR.

DREDGING AT OROVILLE.*

By Newton B. Knox.

The gravelly bottom land below Oroville, California, is being extensively mined for gold by means of dredgers. Upon a strip of land, 9 miles long by 2 miles in width, bordering on and adjacent to the Feather River, 21 dredgers are at present working. These dredgers are the property of about twelve companies, who own dredging land varying from 80 to 800 acres. The companies are all close corporations, and though the official figures of working costs and profits are difficult to obtain, it is well known that they yield their stockholders excellent dividends. For instance, one company's working expenses, including labor, repairs, power, interest on capital invested, depreciation of plant, sinking fund, etc., amounted to but 32 per cent of the bullion output, leaving the remaining 68 per cent clear profit.

The total general average of the drillings of several of the largest companies' holdings, covering a period of several years, gives the value of the gravel between 17c. and 19c. per cu. yd., and an average depth of 11 yd. As a dredge handles from 1,200 to 2,000 cu. yd. per day, at a cost of from 5c. to 8c., average 6c., per cu. yd., it is evident that the returns in this work are considerable.

In the early days of California history, Oroville district was extensively mined by first the white man and later by the Chinese. It is claimed that $82,000,000 has been taken out within a radius of 8 miles of the town of Oroville. The gravels were worked to water level, and washed mostly in hand rockers. Pits and small shafts were sunk until a rich pay streak was encountered, which was followed, drifted out, hoisted to the surface and rocked. Water interfered greatly with this style of mining, and only the richest streaks could be worked. The gravels left made excellent dredging ground.

The gravel deposits about Oroville evidently represent the flood plain of an ancient stream of the Sierra Nevada, near the point where it debouched into the gulf which then occupied the present Great Valley of California. As stated, the gravels average about 33 ft., varying from 28 ft. to 60 ft. in depth. A false bed-rock of lava-ash, or volcanic tufa, varying from the consistency of chalk to that of firm sandstone, is encountered at this depth. Below this false bed-rock are gravels and sand. In one place a hole was drilled 80 ft. below, and showed sharp white sand. In some places the gravel is topped by a red soil overburden, varying from 10 ft. to 25 ft. in thickness. This overburden, and the material below the false bed-rock, contain little or no gold. The gravel is fairly coarse, large boulders, weighing 300 lb. or 400 lb., being very exceptional. One-half of the gravel will pass through a ½-in. screen. As a rule the gravel is not cemented, though some dredgers have encountered pieces ground which had to be loosened with powder.

The gold is distributed more or less equally throughout the gravels. Rich concentrated streaks of from an inch to a foot in thickness occur, followed by barren sandy areas, which seem to represent varying conditions of flow in the depositing stream. The gold is in a very finely-divided state, and easily caught by the riffles, cocoa-matting, and quicksilver of the dredge. Nuggets are a rare occurrence. The gold found in the bore-holes is 922 fine, and worth $19 an oz. The dredge bullion is somewhat lower grade, the base being the surprisingly large amounts of lead in the form of quail, rabbit and duck shot, which the dredge digs up.

This fact is interesting and would be hard to believe if it were not very well authenticated. This region has been a great small-game country, and during the last 50 years doubtless thousands of pounds of shot have been scattered over the gravels, which the dredge is now recovering. Nor does it require such reckless shooting on the part of these old hunters to reduce the bullion grade as would at first appear. Take an 11-yd. bank of gravel; this contains 50,000 cu. yd. to the acre—a dredger could treat an acre of this a month, producing a bar per month of say $10,000, or, roughly, 500 oz. of bullion. Now, if the bullion from drillings went $19 = 950 fine, all gold, and if the bullion from dredger went $17 = 850 fine, all gold, or 50 oz. gained in lead in the 500 oz. bar, 50 ordinary shot-gun shells, 12 gauge, would furnish this much shot. The baseness of the bullion, however, does not truthfully represent the amount of shot, as on most of the dredgers the lead is separated by panning, and carefully picked before the bullion is melted. On the Butte dredger they have collected about 50 lb. of shot from about two acres of gravel.

Occasionally a pistol ball is found, recalling the golden, glorious old days of California history, when some festive "man behind the gun," filled with enthusiasm and "barb-wire" whisky, would sally forth in search of trouble, and—generally find it.

The Oroville district is peculiarly favorable for dredging, for the following reasons:

(1) Bed-rock (so-called) is soft and easily cut by the dredge.
(2) Boulders are small.
(3) Water is available. . .
(4) Power (electric) is cheap.
(5) Gold is fairly evenly distributed.
(6) Climate is such that work can be carried on twelve months of the year.
(7) Labor is cheap and efficient; and finally
(8) The gravels contain enough gold.

*Abstract from "Dredging and Valuing Dredging Ground in Oroville, California." *Proceedings* of the Institution of Mining and Metallurgy, London, June 18, 1903.

LAKE SUPERIOR TRAFFIC.

Although there is a shortage up to this time of something more than 600,000 gross tons in the lake ore movement, and some shortage also in grain as compared with last year, these losses have been more than made up by a movement of coal that is unprecedented in the history of the lakes. On August 1 the increase in coal shipments, hard and soft, to Lake Superior alone was 1,266,390 net tons, and the increase in the shipments of all kinds of freight was 655,563 tons. These figures are from reports of the traffic of both canals at the Sault, Canadian and United States.

The comparative figures for the two years are as follows, showing the total freight carried, in short tons:

	1902.	1903.		Changes.
East-bound	13,886,984	13,324,614	D.	562,370
West-bound	2,681,915	3,899,748	I.	1,217,833
Totals	16,568,899	17,224,462	I.	655,563

The shortage in east-bound freight was more than made up by the increase in west-bound. The universal freights included in the totals were as follows, also in short tons, except salt, which is in barrels:

	1902.	1903.		Changes.
Anthracite	105,228	431,165	I.	325,937
Bituminous	2,197,418	3,137,871	I.	940,453
Total coal	2,302,646	3,569,036	I.	1,266,390
Iron ore	11,594,239	11,191,907	D.	402,332
Pig and man. iron	72,260	69,322	D.	2,938
Copper	54,362	43,945	D.	10,417
Building stone	20,081	4,590	D.	15,491
Salt, bbl.	251,021	208,674	D.	42,347

Concerning the present movement the Cleveland *Marine Review* says: "The three phases of the market are the tremendous up movement of coal, the dearth of grain and the free movement of ore. The Lake Erie docks have lately been giving better dispatch, so that the August movement of ore will probably exceed that of last year. A remarkable feature of the lake trade is the ease with which a tremendous movement may be accommodated. Once it is attained, staggering at its proportions are in contemplation, it seems a matter of the most ridiculous ease to maintain it. Should the August movement exceed that of last year it would still require approximately 3,500,000 tons a month for September, October and November to bring the total shipments of ore up to last year. This rate of shipments does not seem probable in view of what is heard of increasing stocks on dock and at furnaces."

A NEW FORM OF BUCKET FOR ORE CARRIERS.

The accompanying illustration shows a new form of bucket for ore carriers or dredges, designed and made by the Jeffrey Manufacturing Company of Columbus, Ohio. It is a variation of the well-known grab, or clam-shell bucket, and is in use very successfully. It is designed especially for a wide reach and for cleaning up the material. These buckets have

JEFFREY GRAB-BUCKET.

a remarkable spread, the 3-ton buckets having an opening of 11 ft. over all, while the 5-ton bucket opens to 15 ft. The closing path is very efficient, and in opening the load is cleanly discharged. Another important feature is the small head room required. This permits the unloader to reach under the decks and also keeps down the height of the hoisting tower.

These buckets will handle ore, coal of all kinds, limestone and sand, and may be used for dredging and excavating.

THE QUICKSILVER INDUSTRY OF CALIFORNIA.

By Wm. Forstner.

The quicksilver industry in California during the last year has continued to experience a slight improvement, in so far that there appears a desire to reopen a few more of the old mines and that capital, more especially Californian capital, is being, to some extent, invested in these undertakings.

The old mines appear to hold their own, some, like the New Idria, with a steadily increasing output. The price of quicksilver, which has ranged between $42.35 and $45.83 per flask in San Francisco, while not high, has been sufficient to render the operations in most mines profitable.

In Colusa county, Mr. G. V. Northey, at the Manzanita Mine, Sulphur Creek, has permanently established the fact that wet concentration of cinnabar ores is not only feasible, but can be made very profitable.

In Lake County the Sulphur Bank and Abbott mines, belonging to the Empire Consolidated Quicksilver Mining Company, have suffered from the litigation in which the company has lately been involved. The Great Western Company is continuing its regular output and developing its mine for future working. The Standard Company is still working the Bullion mine, and Mr. A. Rocen is opening the Helen mine with a fair promise of success.

At the Oathill mines, in Napa county, one of the two furnaces has been entirely renovated, and the Corona and Twin Peak mines, close to the former, are both producing quicksilver. In the Aetna mines prospecting work to determine the future of the property is being actively prosecuted. In the Knoxville district the old Redington mine, now the Boston, has been reopened and is a steady producer; the Manhattan is also steadily operated and producing.

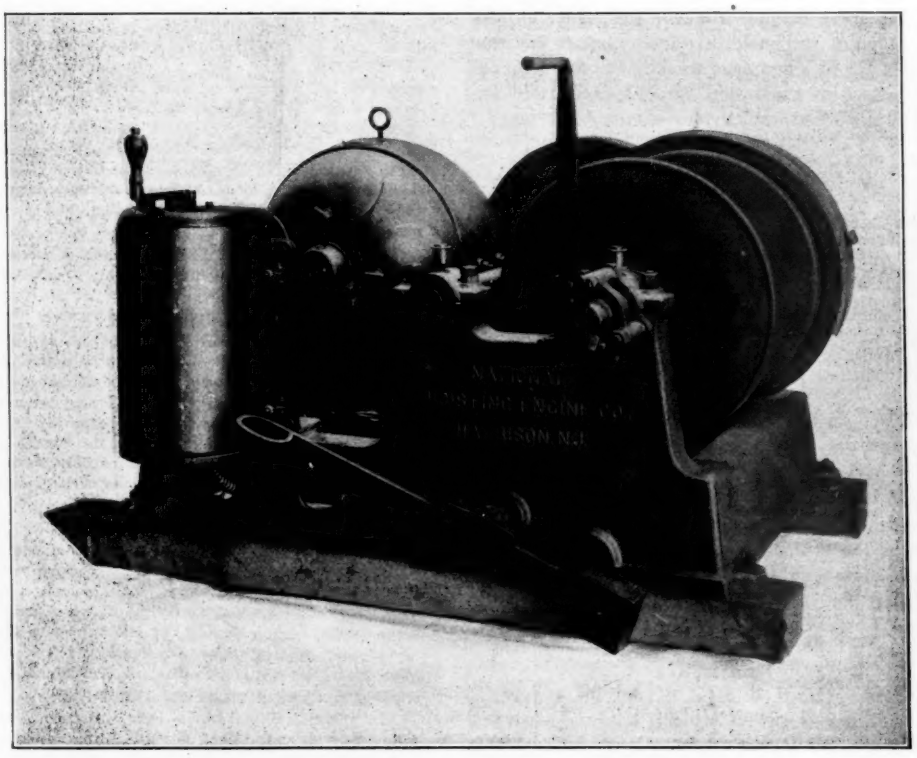
In San Benito county the New Idria has entered upon a new era of prosperity, producing about 160 tons per day and having a great amount of ore available. In the Cerro Benito mine some work has been done to reopen the old workings, and the old furnace has been rebuilt. In the Picacho mine development work has also been done.

In San Luis Obispo county considerable activity is

shown; the Karl mine is a steady producer, and the Oceanic, where the new Scott furnace has recently been put in operation, promises to be also; besides these, development work has been actively pushed on a great number of smaller properties, as, for example, the Alice, Modoc, Libertad, Madrone and Pine Mountain, while others have changed hands and been purchased or bonded by parties who intend active operation. The Stayton mine is being reopened by its former owners.

In Santa Clara county the New Almaden continues to be a large producer; the Guadalupe mine is producing quicksilver from the works near the surface, and the operators are seriously endeavoring to unwater the mine. At the Santa Teresa mine a new Scott furnace is in course of erection. The Summit mine, on the line of Santa Clara and Stanislaus counties, has recently passed into the hands of a corporation, formed by the previous owners, which is also starting the erection of a Scott furnace.

In Sonoma county a number of old mines have been reopened during the last year. In the Pine Flat district the Crown Point Company is reopening the old Sonoma mine; the Pacific Company has done sufficient work on the adjoining property, the Crystal, to justify the erection of a furnace, which will be installed this year. The Cloverdale is steadily operating its seven-ton furnace, and the Culver-Baer promises to give good results with a new modified Livermore furnace. The Socrates has been producing during the last four or five months. The Great Eastern, near Guerneville, still maintains a regular output. In Trinity County the Altoona property is again producing some quicksilver from the surface works and dumps; the Boston & Integral Company is steadily developing its property, as are several minor properties. In Fresno, Kings and Monterey counties some work is done on a number of prospects having more or less merit.



MOTOR DRIVEN MINE HOIST.

A MOTOR-DRIVEN MINE HOIST.

The motor-driven friction-drum hoist illustrated herewith, has been built to meet the demand for a small, compact, portable, and, as nearly as possible, indestructible machine for use in mines, quarries, on board ships, and for contractor's purposes generally. It is manufactured by the National Hoisting Engine Company, of Harrison, N. J., and is equipped with a Crocker-Wheeler fully inclosed type series motor which drives the drum through two trains of reducing gears. The portability of the outfit is indicated by the cut which shows the motor, controller, drum, etc., all supported upon the one cast-iron base. The motor is of 7½ h. p. size, wound for 220 volts, and drawing normally at full load a current of about 30 amperes. The controller, which is of Cutler-Hammer make, designed for intermittent regulating duty is of the size to accompany a 7½ h. p. motor, and allows twelve speeds in either direction.

At a maximum of speed and power the hoist is capable of lifting 1,500 lbs. at the rate of 125 ft. per minute, with the motor running at 800 revolutions per minute. The position of the operator is at the side of the machine, shown in the picture where, with his left hand on the controller he can govern the speed of rotation of the drum in either direction, or, with his right hand on the chuck-release, may disconnect the drum from the gears and allow it to rotate under the weight of its load while checking the speed by applying the friction band brake with his foot.

The equipment throughout is admirably adapted to withstand the rough usage and exposure that it must naturally be expected to receive. The resistance used in connection with the controller is of the Carpenter enclosed form and mounted in a safe position under the base of the frame. The leads between the controller, motor and resistance are run in flexible metallic conduit, and all delicate parts liable to disarrangement are carefully enclosed and protected from dust, moisture and results of careless handling.

ABSTRACTS OF OFFICIAL REPORTS.

Wolverine Copper Mining Company, Michigan.

The report of this company for the year ending June 30, 1903, shows that at the close of the year the total assets, including cash on hand, copper unsold, accounts receivable, etc., amounted to $516,164. Accounts and bills payable amounted to $63,373, leaving a surplus of assets amounting to $452,790.

The statement of mine operations shows that during the year Nos. 3 and 4 shafts were sunk 431 ft.; other work included raises 197 ft.; levels and crosscuts, 4,531 ft. The total amount of stoping was 17,121 fathoms. The total quantity of rock hoisted during the year was 299,922 tons, of which 20,911 tons, or about 7 per cent, was discarded as waste. The rock stamped was 279,011 tons, the product being 11,330,370 lb. mineral, which yielded 8,260,386 lb. refined copper. The average tenor of copper was therefore 29.60 lb. per ton stamped, or 1.48 per cent. The cost per ton of rock hoisted was $1.51; per ton of rock stamped, $1.62. The cost per pound of refined copper is shown in the table below, which also gives the earnings and expenses during the year:

	Amount.	Per Lb. Copper, Cents.
Copper sales	$1,030,756	12.480
Interest	2,504	0.029
Total receipts	$1,033,260	12.509
Underground expenses	$263,628	3.191
Rock house	25,364	0.307
Stamp-mill	116,542	1.411
Surface and incidental	46,206	0.560
Total mining expenses	$451,740	5.469
Smelting, freight and marketing	97,183	1.176
Total working expenses	$548,923	6.645
Construction	38,014	0.460
Total expenditures	$586,937	7.105
Net earnings	$446,343	5.404

To the net profit shown above is to be added the balance of $276,468 carried over from the previous year, making a total of $722,791. From this were paid two dividends, one in October and one in April; the total amount being $270,000. This left a surplus of $452,791 forward to current year.

The construction account consisted mainly in the completion of the new stamp-mill, but a small amount was expended in erecting the new air compressor and the addition to the compressor-house. The new mill was completed in August, 1902, and commenced to do full duty September 1; it is capable of treating 1,000 tons of rock a day, and can be pushed to a little beyond that quantity.

President John Stanton's report says: "The new stamp-mill on Traverse Bay went into commission in August, as shown above, and the predictions made in the last report as to its duty, as well as the reduction in the cost of copper produced, have been fully realized. The completion of the new mill and its appurtenances, with other equipment needed for handling the increased output, including additional dwellings, called for the expenditure of $38,014. The equipment of both mine and mill may now be considered complete."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Picturesque Gold, Silver and Copper Mining in Yavapai County, Arizona. Prescott, Ariz.; A. E. Suppiger. Price, $2.

Further Contributions to the Manufacture of Artificial Sandstone or Sand Brick. By S. V. Peppel. Louisville, Ky., published for the author. Pages, 57; illustrated. Price, 50c.

Census of the State of Tasmania, 1901. Part I.—VIII. Hobart, Tasmania; Government Printer. Pages, 439, with map.

Nineteenth Annual Report of the Commissioners of the State Reservation at Niagara. Albany, N. Y.; State Printers. Pages, 277, with map and illustrations.

Geological Survey of Canada. Supplementary List of Publications of the Survey from 1900 to 1903. Ottawa, Can.; Government Printing Office. Pages, 11, with map.

BOOKS REVIEWED.

Map of Peru. 1903. Published under the authority of Don Eugenio Larrabure y Unanue, Minister of Foreign Affairs. Southampton, Eng.; Eduardo Higginson, Consul of Peru.

There are perhaps few better ways of calling attention to the great industries and resources of a country than by issuing a carefully compiled map, accompanied by a concise description. The official map of Peru is of convenient pocket size, the geographical divisions are intelligently drawn and colored, and the statistics in the text are brought up to the close of 1901, where possible. The distribution of this map is opportune, as foreign capital, particularly American, has recently been invested in the great mineral resources of Peru.

Picturesque Gold, Silver and Copper Mining in Yavapai County, Arizona. Prescott, Ariz.; A. E. Suppiger. Price, $2.

This is a prettily illustrated folio, accompanied by a map and brief description of the principal mines and metallurgical works in Yavapai County, Arizona. In collecting and publishing photographs in color, care has been shown in selecting the views so that the great mineral wealth of the territory may be pictured to advantage. Among the more interesting photographed objects are the great smelting works of the United Verde Copper Company, in the Verde district, the stamp mills, concentrating and cyaniding plants of the Congress Consolidated Mines Company, in the Martinez district, and the newer mines and works in other promising localities.

Gold Mining and Milling in Western Australia, with Notes Upon Telluride Treatment, Costs and Mining Practice in Other Fields. By A. G. Charleton, London; E. and F. Spon; New York, Spon & Chamberlain. Price, $10.

This is a handsome book of about 650 pages, well illustrated and characterized by excellent printer's work. It treats of the geological features, mining practice and milling methods of the rich gold-fields of Western Australia. Much of the book is based on the articles contributed by the author to the *Engineering Magazine* in 1901, but additions and revision have put the material in a form more suitable for reference. The chief objects of the author have been, first, to present a history of gold mining in Western Australia; secondly, to explain the peculiar difficulties that have been encountered in the treatment of the sulpho-telluride ores of Kalgoorlie; thirdly, to draw a comparison between the conditions that obtain in Western Australia and other mining regions; fourthly, to show by figures of production and other facts that the mining industry of this Australian state is on a sound footing; and, fifthly, to furnish data, particularly in regard to costs, that may serve to promote future economies.

Mr. Charleton has carried out his purpose, so that every one interested in West Australian mining will find this book indispensable. While his own observations have covered the ground very fairly, Mr. Charleton has evidently taken pains to get hold of everything which has been written on the subjects discussed by him, with the result that his book includes references to all the various articles on Western Australian mining which have appeared during the last five or six years. Such painstaking compilation is rendered valuable by the wide personal experience and pleasant literary style of the author, whose reputation will be enhanced by the production of this monograph on the mining and milling methods of a new and progressive gold-field.

Chapter I. gives a brief outline of the history and general features of the country to be described. Chapter II. deals with the geology of the region, especially the East Coolgardie district. Chapter III. describes the peculiar cement deposits which characterize this desert tract, with a discussion of the origin of the rich patches of gold-bearing detritus which they have yielded. Chapters IV. and V. are devoted to the geological and mineralogical features of Kalgoorlie, with particular reference to the tellurides, the structure of the ore-bodies and the problems of secondary enrichment. Chapter VI. describes the methods adopted to overcome the scarcity of water, with details as to the construction of "condensers." The celebrated Coolgardie water-supply scheme is described in detail. Chapter VII. is given to the mining practice at Kalgoorlie, with a large number of excellent underground photographs. Chapter VIII. deals with the milling practice at Kalgoorlie. This is a subject which is atracting much interest at the present time. Mr. Charleton gives details of the methods employed at the various mills. Chapter IX. is a sequel to the preceding chapter, as it considers the treatment of sulpho-telluride ores. The rival processes—Diehl, Riecken, Roasting, Oil Concentration, etc.—are passed in review, and the cyanider will find much information which will prove suggestive to him in other districts where similar problems have to be faced. Chapter X. is devoted to economics and statistics; it covers 172 pages, and comprises a large mass of information which mine managers will dissect with interest.

The foregoing resumé will give the reader an idea of the scope of the book; it remains but to say that it is the work of a practiced writer, who has achieved distinction in his profession. It is a useful addition to the library of technology.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Belief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Infusorial Earth.—Can you give me the names of any companies mining or dealing in infusorial earth?—O. S. S.

Answer.—By ascertaining the names of wholesale dealers you are put in communication indirectly with miners, as the business is done chiefly through middlemen. Among the more important dealers are Hammill & Gillespie, 240 Front street, New York city, and L. A. Salomon & Bro., 216 Pearl street, New York.

Bone Ash.—Can you give, in outline, the commercial process of manufacturing bone ash for assayers' use?—M. W.

Answer.—In relation to this question, which was published, with an answer, in our issue of July 25, Mr. H. D. Baker, of Attleboro, Mass., writes: "Allow me to add to your answer, regarding the process of manufacturing bone ash, a detail that is important for a good ash. If it is too fine, the cupel will crack; if, on the other hand, it is too coarse, the cupel will be too absorbent. The medium between the two extremes is such a degree of fineness that all the ash will pass through a 70-mesh sieve, and 25 per cent of it will remain on a 100-mesh screen."

Treatment of Silver Ores by Percolation.—I was greatly interested in the article on the cyaniding of silver ores by percolation by Messrs. Griffiths and Oldfield in the JOURNAL for July 18, 1903. If possible, I should like to know in what manner the precipitatates are handled, as the cost of 5½c. per ton strikes me as being extraordinarily low. Can you tell me what fineness the slimes are as cleaned up, and whether acid treatment, roasting or direct melting, is employed to turn out bullion at so low a figure? It also seems to me that the cost of cyanide, 65c. per lb., given in the article, is too high. I know that considerable quantities of sodium cyanide, guaranteed 120 per cent pure KCy, are being imported via Tampico and Vera Cruz, and delivered at Guanajuato or Marfil at a cost of about 88c. per kilo of KCy. This cyanide is in every respect a good clean product free from sulphides and sulphocyanides.—S. W.

Answer.—The slimes run from 65 to 75 per cent silver and $8,000 to $10,000 in gold. They are not treated on the spot, and the cost of 56½c. per ton is derived from the difference between the assay value (after deducting taxes, etc.) and the price received from the National Smelting Company, to whom they are sold at the mill. The National Company ships the slimes to England for treatment. The cost of cyanide at 65c. per lb. being Mexican currency is, of course, variable. The freight charges to Chinipas are necessarily high, owing to the changes from rail to boat at Guaymas, boat to wagon at Agiahampo, and wagon to cargo mule at Van Banardo. Customarily from 10 weeks to four months elapse from the time of placing the order to the receipt of the cyanide, which is also an inconvenience.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared:

Week Ending August 19, 1903.

736,344. FAGOT FOR TUBE-MAKING.—Winslow Alderdice, Warren, Ohio. A fagot for tubes comprising a coiled bar of quadrilateral cross-section, and a surrounding casing for the same.

736,348. DITCHING-MACHINE.—Francis J. Beckley, Royal Center, Ind. In a ditching-machine, a frame, supporting-wheels therefor, scoop at each end of the frame, endless carriers movable transversely, and means for operating the carriers in opposite directions.

736,352. CHARGING-CAR FOR BLAST FURNACES.—George W. Bollman, Pittsburg, Pa. Assignor to Otis Elevator Company, East Orange, N. J., a corporation of New Jersey. In a blast-furnace the combination of an inclined track, of a car-frame running upon the track, a bucket free to move upon car-fame, means for keeping the bucket at forward end of the car-frame, and a fixed bumper to stop the bucket at a desired point.

736,353. BLAST FURNACE.—George W. Bollman, Pittsburg, Pa., assignor to Otis Elevator Company, East Orange, N. J., a corporation of New Jersey. In combination with a furnace, a hopper closed at its lower end by a bell, and at its upper end by a seal consisting of two or more leaves, mechanically connected outside of said hopper so that when opened they will all move simultaneously an equal distance from the center of the bell, substantially as described.

736,365. BLAST FURNACE.—John C. Cromwell, Cleveland, Ohio. assignor to the Garrett Cromwell Engineering Company, Cleveland, Ohio, a corporation of Ohio. The combination with a blast furnace, of an inclined bridge leading to a point over its top, the upper end of the bridge being supported on vertically-extended members situated on opposite sides of the hopper.

736,366. BELL GEAR FOR BLAST FURNACES.—John C. Cromwell and Carl W. A. Koelkebeck, Cleveland, Ohio. A furnace having a movable closing bell, a counter-weight arranged to hold the bell closed, and an operating connection extending from the furnace top down to a convenient level and having actuating mechanism arranged to lift the counterweight.

736,381. PROCESS OF PURIFYING GRAPHITE.—Moritz F. R. Glogner, Freiburg, Germany. A process for purifying graphite in a wet and cold manner by the use of water and petroleum, consisting in the following operations: Purifying the graphite from its heavy admixtures by a washing with cold water; mixing the purified graphite with about three or four times its weight of cold water; very strongly agitating the paste within a closed vessel after the addition of a quantity of petroleum of about half the weight of the pure graphite contained in the mixture; and then sprinkling water over the surface of the liquid, after the mixture has been allowed to stand, in order to obtain a quicker and more complete separation of the graphite particles from the earthly substances.

736,385. LOADING DEVICE.—William E. Hamilton, Zanesville, Ohio. A loading device comprising actuating mechanism, gathering mechanism and a universal shaft-coupling constituting both the support for the gathering mechanism and the means for connecting it to the actuating mechanism.

736,397. ELECTRIC DRIVING APPARATUS FOR CENTRIFUGAL MACHINES. Ludwig Hirt, Grevenbroich, Germany. The combination of the casing provided with an open-work member or strap, a drive-shaft made in two sections, one of which is movable lengthwise, a motor surrounding the movable section of the shaft and capable of

being removed transversely through the open-work member of the frame, the motor being arranged to drive the shaft, and means for connecting the shaft-sections.

736,398. AIR PUMP.—Louis E. Hoffman, Cleveland, Ohio. In an engine, the combination with air-pump having a notched oscillatory pump-rod, and a lever actuated by a reciprocatory part of the engine, having a projection adapted to engage the notch of an engaging gear including a lever under control of the operator, and a connecting rod between the lever and the pump-rod.

736,400. PROCESS OF MAKING NICKEL-IRON ALLOYS DIRECTLY FROM ORES.—Noak V. Hybinette, Bayonne, N. J., assignor to International Nickel Company, a corporation of New Jersey. The process is composed mainly of sulphides of iron, nickel and copper, consisting in roasting the ore with salt, heating the material so as to decompose the chlorides of iron and nickel, leaching out the chloride of copper and then reducing the residue directly into nickel-steel.

736,411. METHOD OF LOCATING MINERALS.—George I. Leonard, Passadena, Cal., assignor of two-thirds to John M. Armstrong, Longbeach, Cal., and Ertell W. Lincoln, Passadena, Cal. The method consists of placing electrodes of different conducting materials in portions of the earth saturated with liquid which acts more upon one electrode than the other, connecting the electrodes by a conductor insulated from the earth, and measuring the resistance of the circuit.

736,419. CASTING SOLID METALLIC BODIES.—Bert. A. Mick, Paterson, N. J. A mold for casting rolls in combination with an annular refractory body located in the mold in spaced relation to the side walls thereof.

736,446. MACHINE FOR DIGGING AND CONVEYING PEAT.—Carl F. Schlickeysen, Steglitz, Germany. In a peat digging and conveying machine, the combination with a conveying-trough for the peat, of an endless chain extending from the trough along the surface of the soil, tools hinged to the chain and adapted to loosen the uppermost layer of the soil and convey it into the trough, means for keeping the chain with its tools in proper working position, and means for driving it in the proper direction.

736,464. GOLD WASHING MACHINE.—Thomas F. Turner and Harry B. Stewart, Canton, Ohio. The combination of a tank with an upper outlet-passage, extended into the tank to a point below the surface of the water in the tank, the tank provided with a concave bottom, elevating buckets located upon elevating-chains, and the elevating chains and buckets extended into the bottom of the tank and movable concentrically over the concave bottom, an inclined way extended from the concave bottom and a submerged centrifugal pan situated in the tank, and means for rotating the centrifugal pan.

736,479. PROCESS OF DEODORIZING OR PURIFYING PETROLEUM.—Friedrich Berg, Warrensville, Ohio. An improvement comprising the treatment of the oil with an alkali for several hours at a temperature considerably above 212° F. in a closed chamber having an air outlet at the top, and condensing, within the upper end of the chamber next over the body of oil undergoing treatment, approximately all of the condensable vapors arising from the oil body and alkali during the treatment and repeatedly converting the oil from a liquid to a vaporous state and vice versa during the treatment within the upper end of the chamber.

736,480. APPARATUS FOR DEODORIZING OR PURIFYING PETROLEUM.—Friedrich Berg, Warrensville, Ohio. The combination, with a tank forming a vaporizing-chamber having a top, a pipe extending upwardly from the top and communicating with the vapor-space forming upper portion of the chamber, and means for heating the chamber, of two manifolds arranged within opposite sides of the upper portion of the chamber and extending circumferentially of the chamber near the aforesaid top, parallel pipe-sections extending and establishing communication between the manifolds and arranged a short distance apart laterally, means for conducting water into one of the manifolds centrally between the ends of the respective manifold, means for conducting water from the other manifold centrally between the ends of the last mentioned manifold, and means for supporting the manifolds and the aforesaid pipe-sections from the tank.

736,492. BRICK KILN.—Carl Cebulla, Chicago Heights, Ill. Combination of a central smoke chamber; an annuloidal burning chamber surrounding the smoke chamber, being subdivided into a plurality of compartments, each communicating with the exterior of the kiln by a suitable passage and each being connected with the smoke chamber by means of a valve-controlled passage; a gas conduit extending along the walls of the kiln between the smoke chamber and the burning chamber in suitable manner to have the temperature of the gas therein maintained through the heat of the smoke chamber; each compartment of the burning chamber having a plurality of gas inlets suitably connected with the gas conduit; and suitable valves for independently controlling the admission of gas to each of the compartments.

736,505. METAL-CUTTING MACHINE.—John H. Doub, Walnut, Kans. A metal-cutting machine comprising a frame, a pair of disk-carrying shafts, with cutting disks, gearing connecting the shafts, an eccentrically mounted shaft carried by the frame at a point above the upper disk carrying shaft, and pitmen connecting the eccentric shaft to the upper disk carrying shaft.

736,508. SHAFT SUPPORT.—Eugene R. Edson, Cleveland, Ohio, assignor of the Edson Reduction Machinery Company, Augusta, Me., a corporation of Maine. The combination, with an upright shaft, of a shaft-steadying tubular member surrounding the shaft, and provided with a stationary table; a stuffing-box around the shaft at the upper end of the shaft-steadying member; a turn-table mounted on stationary table, and means for rotating the shaft, comprising a wheel supported from and a suitable distance above the turn-table and operatively connected with the shaft.

736,513. PIPE-LINE VALVE.—Charles E. Fowler, Seattle, Wash. In a pipe-line adapted to transport fluids carrying a percentage of solid matter; a tubular body having a straight bore, substantially equal in diameter throughout to that of the pipe; a spill-port arranged in the body for discharge laterally therefrom, means to effect a closure of the pipe beyond the port whereby a chamber is formed for the accumulation of a portion of solid matter, and means to effect a closure of the port.

736,519. QUARTZ MILL.—Charles J. Hodge, Houghton, Mich. Combination of two relatively movable grinding-cones, a step upon which the pivot of one of the cones is mounted, a driving shaft operatively connected with the cones, a cam on the driving shaft, and a pivoted lever engaging the cam and supporting the step.

736,542. GOVERNOR.—Gustav B. Petsche, Philadelphia, Pa., assignor to the Southwark Foundry and Machine Company, Philadelphia, Pa., a corporation of Pennsylvania. A steam engine governor, having in combination, a spindle, rotatable and longitudinally movable in its bearings, means for driving the spindle, operative when the spindle is in normal position, weights secured to the spindle and operated by it, a sleeve connected to the weights and coupled to operate a regulating-valve, and means for shifting the spindle and sleeve longitudinally to disconnect the governor from the actuating mechanism and to adjust the sleeve and its valve connections to a determined position.

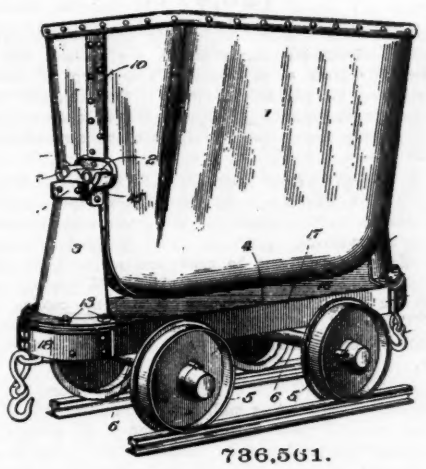
736,549. PUMPING DEVICE.—Frank L. Robertson, Omaha, Neb. The combination with a suitable supporting frame, of a pendulum secured to the supporting frame, bearing blocks secured to the pendulum to provide an angular bearing slot, a vertically reciprocating panel, a sheave adjustably secured to the panel and working between said bearing blocks, a striker block provided with two bearing-faces upon each side secured to aforesaid pendulum, a plurality of driving gear mechanisms, an arm-shaft operated by each of the driving gear mechanisms, arms secured to each of the arm shafts, adapted to come in engagement with the bearing-faces, and stops normally checking the movement of aforesaid arm shafts, aforesaid striker block being adapted to come in engagement with aforesaid stops to alternately operate the same to intermittently release the arm-shafts.

736,555. PNEUMATIC TOOL.—Charles H. Shaw, Denver, Colo. Combination of the cylinder having at one end an annular valve-chamber of a diameter greater than the bore of the cylinder, the chamber having two concentrically-disposed shoulders arranged in different planes, a peripherally-ported annular valve guided within the chamber and adapted to fit against the shoulders, the valve having a central bore of a diameter equal to the bore of the cylinder and the area of the lower face of the valve being less than the area of the upper face thereof, means for closing the upper portion of the valve-bore to form a dead-cushion space within the valve, a piston adapted to enter the bore of the valve after leaving the cylinder and to effect an opening movement of the valve by the compression of air during the latter portion of the piston stroke, the valve-opening movement being in the same direction as that in which the piston is traveling, a piston-controlled port leading to the valve-chamber, longitudinal ports formed in the valve between one of the peripheral ports and the upper end of said valve to permit the entrance of air under working pressure to the valve-chamber, and ports or passages leading through the walls of the cylinder and controlled by the valve.

736,563. AUTOMATIC REGULATOR FOR LIQUID FUEL BURNERS.—Alfred C. Stewart, Santa Paula, Cal. A body having two ways and valve seats therein; valves for the seats; a rod arranged for positively opening both valves and for positively closing one of the valves only; means for yielding closing the other valve; means for yieldingly holding the rod in position for opening both valves; and fluid-operated means for operating the rod for closing the valves.

736,565. PROCESS OF ZINCING OBJECTS BY ELECTROLYSIS.—Ignaz Szirmay, Budapest, Austria-Hungary, assignor of one-half to Ludwig Von Kollerich, Budapest, Austria-Hungary. The method of zinc-plating objects, consists in placing such objects as cathode with a suitable anode in an electrolyte of an aqueous solution of a zinc salt, dextrose, and a mixture of sulphates of aluminum and magnesium, and passing an electric current.

736,561. MINE CAR.—Thomas Stagg, Columbus, Ohio, assignor to the Kilbourne & Jacobs Manufacturing Company, Columbus, Ohio, a corporation of Ohio. Combination of the body having trunnions, the standards having trunnion-bearings, and the longitudinal base from which the standards project upwardly; the base being forged from wrought metal with a flat top having rounded ends and a continuous vertical flange integral with and conforming to the outline of the top.



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736,572. HOISTING MACHINE.—Wendell A. Barker, Chicago, Ill., assignor to Emmet A. Thomas, Chicago, Ill. In a hoisting machine, the combination with an electric motor adapted to be contuously driven in one direction and a cable-driving shaft, of a pair of clutch-shafts between the motor and the cable-driving shaft, intermeshing gears on the clutch-shafts, respectively, one of which is driven by the motor, clutch members fast with the gears, cooperating clutch members loose and slidable on the clutch-shafts, gears fast with the slidable clutch members, a gear on the cable-driving shaft intermeshed with both of the last-named gears, co-operating slidable and stationary cam devices on each of the clutch-shafts, a main operating lever and connections therefrom to both of the slidable cam devices whereby one of the latter may be caused to effect the engagement of the members of one clutch and the other may simultaneously permit the disengagement of the members of the other clutch.

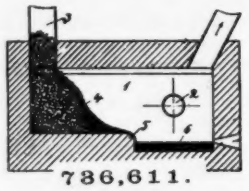
736,578. METHOD FOR OPERATING STEAM POWER PLANTS.—Philippe L. Clark, Chelmsford, England, assignor of one-tenth to Albert H. Overman, Chelmsford, Essex county, England. The method consists in geenrating live steam, conducting a portion of the live steam to an inclosed space, operating a motor by the pressure of the steam therein, injecting the exhaust from the motor to the inclosed space by means of the live steam, returning a portion of the mixed live and exhaust steam and water of condensations of the inclosed space to the live steam generator and maintaining a predetermined difference of pressure between the live steam in the generator and the mixture of live and exhaust steam in the inclosed space.

736,579.—STEAM POWER APPARATUS.—Philippe L. Clark, Chelmsford, England, assignor of one-tenth to Albert H. Overman, Chelmsford, England. The combination with a generator, of a reservoir, a suction and compression device interposed between the generator and reservoir, a motor, means for heating the exhaust of the motor and conveying such heated exhaust to the device from which it is introduced into the reservoir by the live steam entering the device from the generator, and transferring means operated by the pressure of the reservoir for completing the circulation of the system.

736,597. BARREL FILTER.—Claude D. Grove, Colorado Springs, Colo. In a barrel strainer the combination with the shell thereof, of a strainer the exterior surface of which is in contact with the barrel, its inner surface being provided with suitable straining-perforations in the form of slits combined with transverse grooves beneath the interior surface and establishing communication between the slits and the discharge opening.

736,602. CONCRETE AND METAL CONSTRUCTION.—Julius Kahn, Detroit, Mich. The combination with a cementitious body of a metallic strengthening member extending longitudinally thereof, and a plurality of uprightly-extending members, rigidly attached to the longitudinal metallic member, at points intermediate to the ends of the latter and projecting obliquely therefrom to form the diagonal members only of a part of a truss, the laterally-extending members being embedded in the cementitious body whereby the stresses are communicated from the latter longitudinally into the main member.

736,611. PROCESS OF EXTRACTING ZINC FROM ITS ORES.—Carl G. P. de Laval, Stockholm, Sweden. The process of treating the ore of a volatilizable metal by radiant heat in an electric furnace which consists first in introducing the ore in comminuted state to form on the bottom of the furnace a pile of gradually decreasing height



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sloping toward a source of electric heat, second causing the non-volatile ingredients of the ore to melt and run down the surface so as to expose new layers of material constituting the pile to the action of the heat, and third, conducting the volatile metal vapors and generated gases by a separate outlet from the furnace and condensing the metal vapors.

736,625. APPARATUS FOR CONDENSING AND MIXING ACIDS.—Francis I. du Pont, Wilmington, Del. The combination with a vessel containing an acid adapted to act as a condensing agent, the vessel provided with means for admitting vapors to be condensed to the space above the acid, of a cooling tank provided with cooling coils, discharge and return passages connecting the cooling tank and the vessel, and a circulating pump for maintaining circulation between the condensing vessel and the cooling tank.

736,657. GRINDING MILL.—Frederic E. Whitam, Oxford, England. In a grinding mill, the combination, with a stationary grinding plate having an annular flat portion and a conical inlet at the center part, the inlet being smaller in diameter at its top than at its bottom where it joins onto the flat portion of the plate, of a driving steam revoluble grinding plate pivoted on the shaft and free to rock thereon, the plate being provided with a conical and pointed center portion which projects within the inlet and having a flat annular portion around the center portion, all the opposed flat and conical portions being provided with ribs or corrugations and a driving connection between the shaft and the plate.

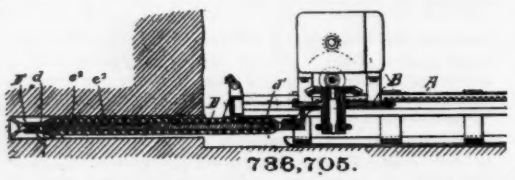
736,664. OIL BURNER.—Thomas Williams, San Francisco, Cal., assignor of one-half to Caesar R. Spliralo, San Francisco, Cal. The combination in an oil burner of an exterior pear-shaped shell convergent from the rear to the front, a bell-shaped chamber within the shell having its open mouth presented toward the rear thereof and a contracted discharge passage toward the front, an oil-admission nozzle opening into the rear of the bell, a steam inlet opening transversely across the mouth of the bell and the oil-nozzle whereby steam is admitted into the interior of the bell to mix with the oil and also exterior thereto to surround and heat the bell.

736,691. CAR STOP.—Clarence R. Claghorn, Wehrum, Pa. In mechanism for arresting and releasing cars, the combination of a stationary stop element and a rotary stop element having two contact devices for engaging with a car, one side of the car, and one near the other.

736,690. CAR UNLOADING APPARATUS.—Clarence R. Claghorn, Vintondale, Pa. The combination of the rotary track means for holding a car thereon, power devices for rotating the track, means connected to the equalizer at its center for moving the equalizer to cause the brakes to be set.

736,696. BAIL FOR SAND PUMPS.—Robert Crytser, Gibsonia, Pa. The combination with the body portion of the pump, a pair of arms secured to the upper edge of the body portion at diametrically opposite points, and extending upwardly in parallel planes, then being increased in thickness and curved inwardly, a tapering external screw-threaded clamping-jaw formed integral with each of the inwardly-curved portions of the arms, the jaws being formed with grooves having their lower ends contracted and the inner faces of jaws at points below the grooves being inclined outwardly therefrom, a cable arranged in the grooves of the jaws and having its lower end raveled, and bent upon itself, and engaging the inclined faces of the jaws whereby the cable is tightly wedged, and a clamping member having a tapered interior screw-threaded portion mounted on the cable and engaging the jaws whereby the jaws are forced inwardly into engagement with the cable.

736,705. MINING MACHINE.—Henry B. Dierdorff, Columbus, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. The combination of a bed, a carriage movable



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thereon, cutters mounted on the latter, and a holding device comprising a chain secured at one or more points to the bed independently of carriage and adapted to travel with the carriage into the kerf and to engage with a wall of the latter.

736,712. SOLDER FOR ALUMINUM.—Ricardo Fortun and Eduardo Semprun, Madrid, Spain. The industrial product composed of an alloy of determined proportions of copper, silver, bismuth, antimony, tin and aluminum, sulphureted and arsenicated.

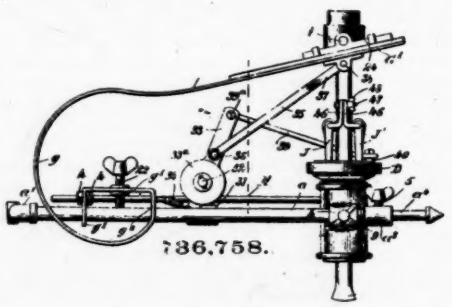
736,715. DIRECT-ACTING GAS ENGINE.—Paul Gervais, Seeburg, Germany. In a rotary gas engine, the combination of twin explosion-cylinders, a shut-off valve provided for each cylinder, separate receiving-chambers, separate means communicating from the cylinders to the receiving-chambers, spring-actuated valves for controlling the supply of gas to the cylinders, spring-actuated valves for permitting the escape of a portion of the products of combustion to one of the receiving chambers, a cam mechanism for actuating alternately the spring-actuated valves, the shut-off valves being opened and closed alternately by the explosion of the gas, a turbine, means for directing continuous supply of the products of combustion upon turbine, and an exhaust.

736,716. WELL DRILLING MACHINERY.—George A. Gilborne, Aberdeen, S. D. The combination, with a wheeled frame, and the tower provided thereon, of a rope-drum and shaft mounted on the frame, means for operating shaft, a shaft connected with the opening means, a disk secured on the shaft and having a slot, a block yieldingly held within the slot, a longitudinally-movable shaft, a crank carried thereby, a pin carried by the crank and arranged to enter the slot, a bar carried by the crank and provided with a pulley over which the rope passes from the drum.

736,730. PROCESS OF RENDERING THE PHOSPHORIC ACID IN NATURAL PHOSPHATES SOLUBLE IN CITRIC ACID.—Gerhard Hoyermann, Hanover, Germany. The process consists of treating 100 parts of the natural phosphate with approximately 30 parts of acid to decompose its by-ingredients.

736,753. APPARATUS FOR THE TRANSPORT OF MATERIALS.—Hermann Marcus, Cologne, Germany.—The combination of a carrying-trough; means for supporting the trough, and guiding it in an approximately right line, while permitting its longitudinal reciprocating motion; a driving-crank; a power transmitting lever with which the crank is pivotally connected intermediately of the ends of the lever; a rod connecting one end of the lever with the carrying-trough; and a guide by which the movement of the opposite end of the lever is permitted and controlled.

736,758. ROCK DRILL.—Charles Mead Murray, Idaho, assignor of five-eighths to M. Prager Company, Limited, and Louis A. Schlesinger and Lewis Prager, Murray, Idaho. A rock drill, having a casing mounted for rotation on its axis, a spring-arm carrying a striking-head, a tool passing through the striking-head and the casing, the



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head extending normally above the tool and slidable independently thereof for a limited distance in the cylindrical casing to turn therewith, and means actuated by movements of the striking-head to impart a step-by-step rotary movement to the casing and the tool guided thereby.

736,778. AIR PUMP.—Walter M. Reason, Pontiac, Mich. In combination with the piston rod of an air pump, a means for reciprocating the piston rod separated therefrom but arranged to engage and actuate the same, a stop on the rod, a pin and means actuated by air pressure for projecting the pin into the path of the stop, means for holding the stop normally out of position to engage the pin, the pin when in its extended position being adapted to engage the holding means to release the stop from its normally retracted position.

736,795, 736,796. CLAM SHELL BUCKET.—John C. Slocum, Columbus, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. The combination of the frame, the power transmitting mechanism, the scoop sections, the pitmen pivoted to the heel ends of the scoop sections, and supporting these ends, and means for thrusting the pitmen endwise, the links which support the front ends of the scoops, the ropes connected to the outer ends of the scoop sections for opening them and lifting the apparatus, the ropes connecting the buckets to the power mechanism, the ropes for actuating the power mechanism and lifting the apparatus and the rope guides arranged to exert draft downward upon the heels of the buckets when they commence to close, the buckets being disconnected from the guides and supported independently thereof.

736,836. ACETYLENE GAS GENERATOR.—John M. Flugstad and Peter M. Flugstad, Corvallis, Mont. In an acetylene gas machine the combination with a gasometer having a movable bell of a generator having a fixed bell, a carbid-hopper supported by the fixed bell and having a discharge opening communicating with the interior of the bell, a valve adapted to open and close the opening, a stem or rod fixed to the valve, an arm fixed to the stem or rod, a laterally projecting belt carried by the arm, means carried by the movable gasometer-bell for engaging the bolt, and actuating the valve.

736,862. DRY SEPARATOR FOR METALS.—Theodore M. Moe, New York, N. Y., assignor of two-thirds to James Wesley Hutt and William Henry Seidel, Brooklyn, N. Y. The combination with a chamber, and means producing a current of air therein, of a plurality of separating-troughs arranged one above another and adjustable bodily, vertically, relatively to one another.

736,869. MANUFACTURE OF LIME AND GAS.—James J. McTighe, Pittsburg, Pa.; Anna McTighe and Mary Adelaide McTighe, executrices of said James J. McTighe, deceased. The method consists in producing a commercial vacuum, calcining a carbonate of lime therein and conducting the gas evolved from the lime into contact with heated carbon.

736,876. PROCESS OF MAKING SULPHURIC ANHYDRIDE.—Emile Raynaud, Spy, and Leon Pierron, Jette-St.-Pierre, Belgium. The process consists in passing a gas containing sulphurous acid and oxygen through vessels heated at a uniform temperature and containing contact substances arranged so that the gas may first come in contact with substances having but a slight catalytic action, then with substances having a more powerful catalytic action and lastly with substances having a less powerful catalytic action.

736,882. ORE DUMPING APPARATUS.—Nels A. H. Salomonson, Norway, Mich. The improved ore dumping car having open bottom, front and rear partitions arranged transversely, the front one extending to a point below the top portion of the car, and a shiftable partition hinged at the top of the front partition and adapted to be swung for opening or closing the rear passage between the two partitions.

736,900. APPARATUS FOR MAKING STEEL, ETC.—Edwin C. Wills, Altoona, Pa. The apparatus comprises the cupola, the rocking table, means for rocking the table, the standards mounted on the table, the cylinders carried by the standards and having piston rods, the dome-section of the converter supported on the piston rods and hinged power mechanism for tilting the dome-section on its hinges, the turn-table journaled by one of the said standards, and the base-section of the converter carried by the turn-table and movable therewith into and out of register with the dome-section.

736,901. CONVEYER.—Freeman R. Willson, Jr., Columbus, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. A conveyor having in combination two parallel chains, each formed of a series of links all similar to each other, and each being a centrally-open rectangular link with side bars, an end bar and a hook detachably engaging with an adjacent end bar and an upwardly-extending centrally-arranged tooth-receiving slat-support, all the parts of each link being cast integral with each other, and a series of slats, each slat having a flat portion and a curved portion, the flat portion being fastened to the tops of two opposite tooth-receiving supports and arranged parallel to the plane of its links and having a curved part under and contacting with the edge of the flat part of the next adjacent slat.

736,902, 736,903. CONVEYING APPARATUS.—Freeman R. Willson, Jr., Columbus, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. The combination of the initial loading-receptacle adapted to receive intermitting charges of relatively large volumes, a conductor trough receiving the material from the loading receptacle and arranged at a relatively steep inclination, a series of traveling flights in the trough, and means for moving the flights downward therein at a speed less than that normally attainable by the material under the action of gravity when it is supported on the trough.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending August 1, 1903.

15,272 of 1902. ROASTING SULPHIDE ORES.—E. H. Miller, London. In roasting sulphide ores, mixing with carbon and sodium sulphide, subjecting the mixture to a low heat with little access of air for a short time, then withdrawing into the air, upon which the sulphur oxidizes rapidly.

18,384 of 1902. SLAG LADLE BEARINGS.—J. H. Dewhurst, Sheffield. Improved form of bearings for slag ladles used in removing blast furnace slag.

21,758 of 1902. ROCK DRILL.—J. Cameran, Blantyre. In hand-operated rock drills, double crank and ratchet operating devices formed with boxes for the purpose of engaging with a tightening-up screwed tube.

7,897 of 1903. GRINDING AND AMALGAMATING PAN.—J. H. Elspass, Los Angeles, Cal. Improved form of grinding and amalgamating pan, in which the pan revolves as well as the rollers, and the outside edge of the grinding surface is higher than the inner.

12,144 of 1903. GUIDE ROPE CLUTCH.—J. Aspinatt, Bolton. Improved clutch for gripping the guide rope when the hauling rope of a mine cage breaks.

TO TRAVELING ENGINEERS.

A room for the exclusive use of visiting engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library at Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep THE JOURNAL informed of their movements and appointments.

Mr. Chas. Butters is in London.

Mr. John B. Farish is in New York.

Mr. R. R. Needham, of London, is at El Oro, Mex.

Mr. Harold Rickard is now at the City of Mexico.

Mr. Ross Hoffmann is at Mazapil, in Zacatecas, Mex.

Mr. C. R. Murdoch, of Butte, Mont., is visiting New York.

Mr. Geo. W. McElhiney has returned to Guanajuato.

Mr. J. Ernest Snelus is in charge of operations in Egypt.

Mr. Philip Argall left New York for Denver on August 26.

Mr. A. A. Blow left New York for Denver on August 22.

Mr. Robt. T. Hill left for Guanajuato, Mex., on August 27.

Mr. George M. Harris, of New York, has been at Alma, Colo.

Mr. C. C. Burger has returned to New York from Tonopah, Nev.

Mr. W. B. Davis, of Los Angeles, has been to Kingman, Ariz.

Mr. H. L. J. Warren has arrived at Salt Lake City from the east.

Prof. Arthur Lakes, of Denver, is examining mines in British Columbia.

Mr. A. C. Beatty left New York on August 22. He is now at Denver.

Mr. John E. Rothwell is now with the Colorado Iron Works Company.

Mr. M. J. Nesbitt, of Choix, in Sinaloa, Mex., is in New York on business.

Mr. Frank Peck, of Colorado Springs, was in New York during the week.

Mr. G. M. Gouyard, of Denver, has gone to Arizona to examine mines.

Mr. C. F. Spaulding, of the Crane Company, is touring southern Idaho.

Mr. T. W. Davidson, of Sumpter, Ore., has returned from an eastern trip.

Prof. M. C. Ihlseng, of Brooklyn, is visiting the mines of Kongsberg, Norway.

Mr. Frank Probert, of Los Angeles, has returned from Arispe, in Sonora, Mex.

Mr. Daniel F. Sheehan has left New York for professional work at Guanajuato.

Mr. Thomas Ellis is superintendent of the Indian Queen mine, near Dillon, Mont.

Mr. Walter H. Weed visited the Ely copper mine in Vermont during the past week.

Mr. V. H. MacLymont, of San Francisco, is attending to mining interests in Mexico.

Mr. S. S. Gates has returned from New York to his mining properties in Jalisco, Mex.

Mr. James Ross has resigned as president of the Dominion Iron and Steel Company.

Mr. Walter McDermott has moved his office to No. 3 London Wall Buildings, London.

The Mansfeld copper mine is under the direction of Koeniglicher Bergrath Schrader.

Mr. L. Humphreys is in the interior of Sonora, Mex., engaged in exploratory work.

Mr. W. K. Ryan, of New York, will remain at Colorado Springs for several months.

Mr. Charles H. Wittenoom sailed from London for Perth, West Australia, on August 13.

Mr. Henry F. Lefevre is in charge of an exploring expedition in the State of Guerrero, Mex.

Mr. W. Stanley Lecky is assayer at the Grace mine, on the Michipicoten river, Ontario.

Mr. Charles T. Joslin is now general manager of the Model Mining Company, McCabe, Ariz.

Mr. H. H. Armstead, Jr., has been to Butte and is now examining mines near Bannack, Mont.

Mr. J. T. Marriner, of London, is on his way to Korea, and will be absent about five months.

Mr. J. Macfarlane is now at Salt Lake City. He will shortly return to Cerro de Pasco, Peru.

Mr. L. H. Carver, of San Francisco, has returned from professional work in Sierra County, Cal.

Judge L. O. Ray, the discoverer of the Ray district, near Tonopah, has returned from the east.

Mr. Arthur Winslow has returned to Kansas City after completing his professional work in Arizona.

Capt. Henry Stern, president of the Tintic Company, has arrived at Salt Lake City from the east.

Mr. Hans C. Behr, formerly in California and now in practice at Johannesburg, is expected in London.

Mr. Thos. H. Leggett has resigned as consulting engineer to Neumann & Company, at Johannesburg.

Mr. Edward Doerr is local manager for the Guggenheim Exploration Company at the City of Mexico.

Manager J. J. Trenam, of the Beaver Consolidated mine of Beaver County, Utah, is in the east on business.

Mr. John H. Hobbs, of La Luz Mines Company, has left Colorado Springs for Guanajuato, Mex.

Mr. W. E. Defty has returned to his home at Phoenix, Ariz., from an extended trip to Sonora, Mex.

Mr. Bernard MacDonald, of Spokane, is examining mines in Idaho and Oregon, in the region of the Snake river.

Mr. Wm. Campbell, of the Columbia School of Mines, sails by the *Carpathia* for London, on September 1.

Mr. H. H. Webb, the well-known Californian engineer, is due in London, from Johannesburg, about this time.

Mr. S. Herbert Cox, of the firm of Bainbridge, Seymour and Company, London, is visiting mines in Cornwall.

Mr. M. M. Johnson, manager of the exploration department of the Newhouse mines in Utah, has been in Michigan.

Mr. W. J. Williams, manager of the Mexican Mine and Smelter Supply Company, is on a trip to the United States.

Mr. H. A. Titcomb, of Denver, has returned from Europe and is now at Wardner, in the Coeur d'Alene district, Idaho.

Mr. R. C. Gemmell, of Salt Lake City, has taken up the work of the late Victor Clement, at Mazapil, Zacatecas, Mex.

Mr. William P. Dunham, of Denver, is in New York city, having returned from Pinos Altos, in Chihuahua, Mex.

Prof. C. Le Neve Foster, of the Royal School of Mines, London, is taking a holiday at Vedes, in Carniola, Austria.

Mr. Fred W. Bradley is at Wardner, visiting the Bunker Hill and Sullivan mines in his capacity as consulting engineer.

Mr. J. B. McIntosh, of the Washoe smelter, Anaconda, Mont., has gone to New Brunswick, Canada, for a month's vacation.

Mr. James W. Neill, of Salt Lake, consulting engineer for the Tintic Company, has been spending a brief vacation in Colorado.

Mr. Geo. N. Howell has resigned his position with the Velardeña Mining and Smelting Company to return to the United States.

Mr. John R. Stanton, of New York, president of the Phoenix mine, will be in the Lake copper country the balance of August.

Mr. Willard F. Snyder, general manager of the Western Exploration Company, has returned to Salt Lake City from California.

Mr. W. W. Rose, superintendent of the Boleo Copper Company, of Lower California, has been in the City of Mexico on business.

Mr. E. F. Shatzer, Salt Lake City, has accepted a position with the Tonopah Gold Mining and Milling Company, of Tonopah, Nev.

Mr. Samuel Storrow has returned from Walla Walla, Wash., and has opened an office in the Mills Building, at San Francisco.

Mr. W. R. Smith, superintendent of the Highland Consolidated mine of Bingham, has returned from a trip to Tonopah, Nev.

Mr. J. W. Cairns has resigned as manager of the Eureka-Ophir mine in Dry Canyon, Utah, and will manage the Erie, at Bingham.

Mr. A. W. Tennant, manager of the Sonora River Placer Mining Company, will make the company's headquarters at Cananea, Mex.

Mr. George A. Packard, of Wakefield, Mass., has been in Baker City, Ore., and is now visiting Madison and Park counties, Montana.

Mr. Gardner F. Williams, general manager of the De Beers diamond mines, of Kimberly, South Africa, has been in Seattle for a few days.

Mr. Horace V. Winchell has returned to Butte, after three months' absence on professional work in the Copper river region of Alaska.

Mr. J. L. Mery has resigned as mechanical engineer for the United Verde Copper Company at Jerome, Ariz., and is in San Francisco.

Mr. Al Huntley, of Joplin, Mo., superintendent of the Empire Zinc Company, is now superintendent of the White Eagle mine at Rush, Ark.

Mr. M. D. Gaylord, superintendent of the American Gold Mining Company's mines at Nogal, N. Mex., recently returned from the east.

Mr. J. B. Coplen, of Tucson, Ariz., manager of the Pacific Mining and Milling Company, is at Globe, Ariz., superintending development work.

Mr. John K. Mackenzie, of Chicago, returned from London by the *Oceanic*, arriving on August 19, and sailed for Bolivar, Venezuela, on August 21.

Mr. C. A. Hardison, who has been professionally engaged in Peru for the last five years, has opened an office in the Douglas Building, at Los Angeles, Cal.

Mr. Edward Brennan, former mine inspector, has accepted the superintendency of the Natalie Colliery, near Shamokin, Pa., operated by the Shamokin Coal Company.

Col. J. F. Allen, of Atlanta, Ga., general manager of the Appalachian Gold Mining and Smelting Company, is in the east in the interest of his company.

Prof. Victor C. Alderson, formerly dean of the Armour Institute of Technology, Chicago, has assumed the duties of the presidency of the Colorado School of Mines at Golden, Colo.

Mr. W. C. Ralston's address is now 331 Pine street, San Francisco. He has resigned the management of the Melones Mining Company, with which he has been identified.

Mr. Gilbert Van Ingen, formerly connected with the New York State Geological Survey, and for some time geologist in the State Engineer's office, has been appointed instructor in paleontology at Princeton University.

Mr. S. T. Wellman, Mr. C. Ernst and Mr. F. W. Moller, of the Wellman-Seaver-Morgan Company, Cleveland, O., have returned from Europe, where they are reported to have closed a contract for the remodeling of a British iron and steel plant.

Prof. Lionel L. Tovey, who occupies the chair of mining in the University of Tomsk, Siberia, has been making a tour of Colorado, including Cripple Creek, to study mining and metallurgical methods. He left Denver on August 20 for the Black Hills, S. Dak.

Mr. Alexander Montgomery, at present State mining engineer in Western Australia, is mentioned as likely to succeed Sir James Hector as director of the Geological Survey of New Zealand. Mr. Montgomery was at one time director of the Thames School of Mines, was afterwards government geologist in Tasmania, and then general manager of the Kauri Freehold Gold Estates Company in Auckland. This latter position he left about a year ago to take his present appointment in Western Australia.

SOCIETIES AND TECHNICAL SCHOOLS.

COLORADO STATE SCHOOL OF MINES.—The fall term will open September 14, with probably a larger attendance of students than ever. From the faculty of 1902-3 the following members will return: Prof. Patton, Prof. Curtis, Prof. Filkins, Assist.-Prof. Hazard, Messrs. Test, Haldane and Eggleston.

New members of the faculty are Herman Fleck, professor of chemistry; L. C. Walker, professor of mathematics; F. W. Traphagen, professor of metallurgy and assaying; E. R. Wolcott, assistant professor of physics; L. E. Young, assistant professor of mining; T. C. Bailar, instructor in chemistry; G. M. Butler, instructor in mineralogy. Two more instructors in surveying and mathematics will be appointed. F. W. Traphagen, professor of metallurgy, is a graduate of the Columbia School of Mines, and has had 15 years' experience in teaching and professional practice. He has been associated with the Daly Mining Company and the Champion Mining Com-

pany, and had charge of the mining exhibit of the State of Montana at the Columbian exhibition of 1893. Prof. Traphagen will reorganize the department of metallurgy and equip the new metallurgical laboratory.

INDUSTRIAL.

The British Columbia Copper Company at Greenwood, B. C., recently let a contract for a smokestack for the smelter, to contain 4,000,000 bricks.

The Raney & Berger furnace erected at New Castle, Pa., in 1872, and now known as Shenango No. 3, of the Carnegie Steel Company, is being torn down to make way for a new 600-ton furnace.

The National Drill and Machine Company of Barberton, O., manufacturing well drilling machinery, contractors' tools and grading machinery, is planning to erect a new building which will about double the capacity of its plant.

The Reeves Engine Company, Trenton, N. J., has completed plans for a new foundry, which it will equip with modern machinery. Estimates are in for the building, which will be 64 by 127 ft., with wings at each end, 26 by 28 ft.

The plant of the Keystone Foundry Company, Uniontown, Pa., operated by C. W. Howell and Robert McDowell, has passed into the hands of the sheriff on an execution of M. Streng Sons, Limited, Pittsburg, Pa., for over $7,000.

The Goyne Steam and Pump Company, of Ashland, Schuylkill county, Pa., has been chartered with a capital of $10,000 to manufacture pumps and general machinery. The directors are C. A. Goyne, F. H. Goyne, J. R. Goyne and A. H. Goyne.

A complete model factory with all appurtenances has been proposed for the Louisiana Purchase Exposition by the Philadelphia Foundrymen's Association. The suggestion was made by Joseph A. Holmes, chief of the Department of Mines and Metallurgy.

The Atlas Car and Manufacturing Company, of Cleveland, has completed the erection of new structural shops, which greatly increase its facilities for turning out cars. The company is at work on 200 small steel cars to be shipped to the Phillippines.

The Loomis Machine Company, of Tiffin, O., manufacturer of oil well drilling machinery, is shipping oil well machinery to Mississippi, Indiana, Kansas and Manitoba, as well as to a number of points in Ohio. It is planning to increase its facilities.

The Lehigh Valley Railroad Company has not awarded contracts for the cranes to be installed in the new shops at Sayre, Pa. The order, it is reported, will amount to about $75,000. The machine tool list for the Sayre shops has not been prepared either.

A successful test was made recently at the works of the Glasgow Iron Company, Pottstown, Pa., of the patented gravity puddling machine invented by James Price, superintendent of the Glasgow works. A heat of 3,500 lbs. was puddled in 40 minutes by two men.

The Salt Lake Engineering Works, Salt Lake, Utah, has closed a contract with the Rio Grande system to furnish all its railroad castings. The company is enlarging and equipping its foundry and machine shops for turning out all general machinery and railroad work.

The Chicago Pneumatic Tool Company, Chicago, has closed a contract with the Chilean Government to supply the latter's navy yard with pneumatic tools. A contract has also been closed with the United States Government to supply tools for the Boston Navy Yard.

The Jacobson Gas Engine Company, of Jamestown, N. Y., has been incorporated with a capital of $1,000,000. The directors of the company are: Charles Jacobson, Jacob Jacobson, M. D. Dunham, Orin C. Allen, of Warren, Pa., and Oscar Stranburg and Jerome B. Fisher, of Jamestown.

The furnaces and shops at Embreeville, Tenn., formerly owned by the Virginia Iron, Coal and Coke Company, have been purchased by C. B. Perin, of Knoxville, Tenn., who will operate the plant under the name of the Embreeville Iron Furnace Company. The plant has a capacity of 175 tons.

Van Voorhis & Sanford, of Monterey, N. L., Mex., have closed a contract with the Negociacion Minera de San Salvador, of Santa Caterina, N. L., for the erection of a cable tramway having a total length of 5,455 ft. and a capacity of 50 tons in 10 hours. All the material will be supplied by the Trenton Iron Company, for whom Van Voorhis & Sanford are agents, and the tramway will be erected by their own engineer.

The Ontario Power Company has decided to make its proposed big flume at Niagara of steel. This flume will have a total length of 5,880 ft., and will be 18 ft. in diameter. The steel will have a thickness of about one-half in., reinforced by heavy steel hoops. It will be built by the Jencks Machine Company, of Sherbrooke. About 200 tons of rivets will be used. A temporary railroad will be built along the route of the flume to handle the steel.

Among the sales of Reynolds-Corliss engines made during the month of July by the Allis-Chalmers Company, of Chicago, were: Consumers' Heat and Electric Company, Bloomington, Ill., one 20-in. and 32 by 36-in. heavy duty cross-compound; Henry Du Pont, Wilmington, Del., one 20 by 42-in. girder frame; Marquette Cement Manufacturing Company, La Salle, Ill., one 20 by 42-in. heavy duty; Manhattan Rubber Manufacturing Company, Passaic, N. J., one 24-in. and 40 by 42-in. heavy duty tandem compound; the Gauley Company, Camden-on-Gauley, W. Va., one 16 by 36-in. heavy duty; Memphis Consolidated Gas and Electric Company, Memphis, Tenn., one 27 and 42 by 48-in. horizontal cross-compound heavy duty direct-conected; Stilwell-Bierce and Smith Vaile Company, Dayton, O., one 16 by 42-in. girder frame; Fourche River Lumber Company, Chicago, one 24 by 48-in. heavy duty, one 20 by 42-in. heavy duty; the Homestake Mining Company, Lead, S. D., and 18 and 32 and 40 by 42-in. combined horizontal vertical triple expansion engine, three 320 h. p. Sederholm boilers; Lacey-Buek Iron Company, Birmingham, Ala., one 44-in. and 84 by 60-in. vertical standard furnace blowing engine.

E. I. Dupont, De Nemours & Company, incorporated under New Jersey law with a capital of $50,000,000 for merging of the various E. I. Dupont-De Nemours properties, and also to take over other concerns has the following officers and directors: President, T. C. Dupont; vice-presidents, Alfred I. Dupont, Francis I. Dupont, Victor Dupont, Jr., J. A. Haskell, A. J. Moxnam and H. M. Barksgole; treasurer, P. S. Dupont; secretary, Alexis Dupont. The directors include T. C. Dupont, P. S. Dupont, Alexis I. Dupont, E. Dupont, Jr., A. J. Dupont, Victor Dupont, Francis I. Dupont, J. H. B. Reilly, A. J. Moxham and J. A. Haskell. The nucleus of the concern is the E. I. Dupont-De Nemours Company, which had a capital of $20,000,000, with headquarters at Wilmington, Del. J. A. Haskell, one of the vice-presidents, is head of the Laflin & Rand Powder Company, which was organized under New York laws in 1869 and has a capital of $1,000,000. It is believed that this company, as well as the Hazard Powder Company, will unite with or at any rate be controlled by the new corporation. Besides Mr. Haskell the officers of the Laflin & Rand Powder Company are: J. L. Riker, vice-president; E. N. Wead, treasurer, and A. W. Higgins, secretary. The directors also include William Barclay Parsons, H. M. Boies, Schuyler L. Parsons, Joseph B. Dickson and L. H. Thayer. It is understood that the new company has acquired several powder concerns located at Scranton, Pa., and also one at Syracuse, N. Y. The stock of the California Vigorit Powder Company has been deposited with the Donohoe-Kelly Banking Company of San Francisco under an agreement with the Dupont-De Nemours Company. It is reported that the Judson Eastern Dynamite and Giant companies may figure in the amalgamation.

TRADE CATALOGUES.

The American School of Correspondence, of Chicago, Ill., now conducted in connection with the Armour Institute of Technology, sends out an attractive illustrated pamphlet containing testimonial letters from men in many parts of the United States who have taken a correspondence course in the American School and from men prominent in the industrial world who approve of the school and its aims.

The McLanahan-Stone Machine Company, of Hollidaysburg, Pa., has published a pamphlet of 36 pages, describing its machines for washing and handling hematite ore, phosphate rock, coal, coke, etc. For ore washing the company makes the McLanahan improved double-log ore washer, which it says is of simplest construction, yet built strongly to stand continuous hard driving. It has large capacity and saves the fine ore. The company uses essentially the same type of washer for washing hard rock phosphate, and has designed plants for washing land pebble as well. Recently the company has introduced in its washer a patent steel shaft of simple construction, that adds much to the efficiency of the washer.

"Pumping by Compressed Air," a pamphlet of 48 pages, sent out by the Pneumatic Engine Company, of New York City, describes the systems of compressed air pumping manufactured, sold and installed by the company. The pamphlet mentions three systems: The air-lift pump, displacement pumps using air expansively, and displacement pumps using air under direct pressure without expansion. The air-lift pump is now in use in many localities, particularly in water works for cities and towns. It has also been used for pumping heavy oils in California wells. Direct-air pumps include the Harris system, and direct-pressure pumps the Halsey, both of which are described briefly and their points of excellence pointed out.

SPECIAL CORRESPONDENCE.

Denver. Aug. 22.

(*From Our Special Correspondent.*)

Two furnaces are now in operation at the Globe smelter of the American Smelting and Refining Company, and ore is coming in freely from the independent mines not affected by the Cripple Creek strike. The other four furnaces in the plant will be put in operation when local conditions justify.

The validity of the Colorado license tax upon corporations, known as the flat tax law, passed at the special session of the legislature in 1902, was upheld on August 17 by Judge S. L. Carpenter, of the district court, Denver. The American Smelting and Refining Company, incorporated under the laws of New Jersey, refused to pay its flat tax of $4,000 for 1902, and the State began proceedings to prohibit the company from doing business in Colorado. The company immediately entered a demurrer, in which the validity of the law was questioned, and the suit became a test case of interest to every corporation in Colorado. Judge Carpenter over-ruled the demurrer, but gave the company 30 days in which to take an appeal. It is probable that the case will be taken immediately to the court of appeals. This patricular case involves about $8,000, the flat tax for the years 1902 and 1903. If the decision is upheld by the higher courts it will mean that the revenues of the State will be increased about $300,000. A few weeks ago Judge Carpenter decided that the same law passed by the regular session of the Colorado legislature in 1901 was invalid because of irregularities in its passage.

William Bate, former president of the Idaho Springs Miners' Union, testified on August 19, at the preliminary hearing at Idaho Springs of the union miners charged with complicity in the recent dynamiting at the Sun & Moon mine, that the two Italians, Napoli and Cabonetti, now in custody, and Filippi Fuoco, the man killed, were selected by the union officials to blow up the mine. Two other men are wanted in connection with the plot, J. E. Chandler, financial secretary of the Idaho Springs Miners' Union, who has disappeared, and D. C. Copley, one of the members of the executive board of the Western Federation of Miners. Fuoco, the man killed, lived at the home of Chandler for some months prior to the explosion. Copley was in charge of the miners' strike at Idaho Springs, as well as of the millmen's strike at Colorado City. The testimony showed that he bought firearms in Denver for use of union men, and that one of these firearms were found beside the body of Fuoco. It was also brought out that an inner circle of the Western Federation of Miners resorts to any and all methods. Eight men in custody were bound over to the district court. Additional warrants have been issued against the members of the Citizens' Protective League of Idaho Springs, who took the suspected union men from the jail on the night of August 29, and expelled them from town. There is a widespread desire on the part of the conservative element that all these cases should be heard before Judge DeFrance, the regular judge of the local district court, if he is sufficiently well to return from California, rather than before Judge Owers, whose unjudicial remarks from the bench in Georgetown in previous stages of these cases have materially aggravated the local situation.

At Cripple Creek there are now about 4,000 men idle and about 1,000 at work. The mines in operation ship their ores to reduction plants not under the ban of the union. Work has been resumed, under an armed guard, on the big drainage tunnel, by the Mine Owners' Association. When the tunnel is completed in 10 or 15 days a number of big mines, it is expected, will be drained and thereby save costly pumping during the strike, making a difference of thousands of dollars to the mine owners, if they choose to allow the mines to remain idle. Work has also been resumed at the El Paso mine, with a full force, and it is said that other mines will start again.

The Mine Owners' Association has recommended that in all Cripple Creek leases the time lost by the strike shall not count as part of the time of a lease; otherwise there would be great hardship for many lessees.

At the annual meeting of the Colorado Fuel and Iron Company, on August 19, the following directors were chosen: John C. Osgood, Julian A. Kebler, George J. Gould, John D. Rockefeller, Jr., F. J. Hearne, Fred T. Gates, E. H. Harriman, Edwin Hawley, Ben Nicholl, John H. McClement, James H. Hyde, E. W. Oglebay and E. Parmalee Prentice. It is said that the stock books showed the largest holders to be: John D. Rockefeller, $6,000,000, par value; George J. Gould, $4,000,000; Butler Bros., brokers for Messrs. Gould and Rockefeller, about $1,500,000; John C. Osgood, $800,000. John D. Rockefeller, Jr., and J. H. McClement held proxies in addition to what was voted by Messrs. Gould and Rockefeller.

It is said that John C. Osgood and Julian A. Kebler were prevailed to remain on the board in an advisory capacity, as F. J. Hearne, the new working

head of the concern, did not care to assume the management of the vast property without the guidance and advice of Messrs. Osgood and Kebler, who have built up the property and business of the company.

San Francisco. Aug. 19.

(From Our Special Correspondent.)

The failure of the New York men who held the bond on the Owens and Washington mines at Julian, San Diego county, is rather a setback to that camp, the best mines of which were discovered as far back as 1870. It was hoped that the deal would go through, that other men might be induced to invest. The camp is rather inactive and few of the mines have attained any great depth; they paid well near the surface, and then struck a barren zone. The miners are confident that the claims will show up well at greater depths, but have not the money for deep sinking. There is some activity at the lepidolite mines near Pala and at the mines near Escondido. A smelter is being constructed at San Diego to treat ores from Julian and Banner districts, but more capital should be put into those districts to develop the mines to furnish an adequate supply of ore.

The equipment for the North Cow creek, Shasta county, power plant of the Northern California Power Company has been delivered at the site and a hundred or more men are digging the 20,000-ft. ditch from Cow creek which will carry 2,400 miners' inches of water and will give 1,200 ft. fall for the turbines. The last 650 ft. of the pipe is 36-in. in diameter and 13-16ths of an inch thick. The power house is nearly completed. The plant will have 3,000 h. p.

Engineers are surveying for a railroad between Nevada City and Lincoln, to furnish cheaper transportation from Grass Valley and Nevada City mines to San Francisco, by connecting at Vernon landing, on the Sacramento river. Among other things the company intends, according to published statements, to put up a smelter at Lincoln for copper and gold ores. The road is thus far on paper only.

Joseph H. Brotherton, of London, has brought suit for about $1,000,000 against J. C. Kemp Van Ee for a one-fourth interest in the Royal Consolidated Mines at Hodson, Calaveras county, where the 120-stamp mill, the largest in the State, recently started up. The question at issue is over partnership relations. Van Ee, with some others, obtained a bond on the Royal, and Brotherton alleges that while still a partner Van Ee left him out of the transaction. It seems, however, that prior to the purchase of the Royal Mr. Van Ee had started in with other men, including Hodson, J. D. Peters and J. U. Castle. The matter will be settled in the courts.

The stockholders in the Home Oil Company, one of the most important oil companies of the State, are dissatisfied with certain of the officers for selling out individual stock without giving notice when water began to come into the wells at Coalinga, Fresno county. The company has paid in dividends $392,500 since 1899. The stock has been held as high as $4.60, and before the recent break was about $3.20, but dropped to $1.65. It seems the president held about 26,000 out of 100,000 shares and sold his stock on information he held, at least so the stockholders allege. He has gone to Wyoming and has thus far made no answer to the statements. Only a month since a contract was entered into to furnish the Standard Oil Company with 18,000 bbls. a month at 65c. a barrel, and the company had been making money with oil at 35c. a barrel. Then one day came a letter from one of the drillers saying that the wells were yielding more water than oil. The stockholders are investigating the properties and are wroth at the drop in value of the stock. Probably most of them would have sold earlier themselves had they known the true state of affairs.

Victoria, B. C. Aug. 18.

(From Our Special Correspondent.)

At the recent meeting in Sandon of the silver-lead miners, having an organization represented by 29 company and three individual operators, a marketing committee, Messrs. G. Alexander, Byron N. White, A. C. Garde, W. E. Zwicky and D. G. Forbes, was nominated to undertake the disposal of the Slocan's silver-lead product. This plan has been adopted in order to guard against discrimination by the smelters against individual mines. The members of the association will sell their output to the committee, who will market it to the best advantage. A report that a contract has been entered into between the St. Eugene mine, at Moyie, and the Trail smelter for the marketing of the whole of the mine's product at the Canadian Smelting Company's works, appears to be premature. The home marketing of ores is one of the stipulations under which the Dominion bounty is offered. At present the two smelters in operation have certainly not the facilities to handle a product equal to that of 1900, or the output which under existing favorable conditions may be maintained. The St. Eugene mine is in a position to ship as much as all the Slocan mines in combination. In the event of difficulty arising it is possible that the government might be induced to allow for a period the marketing of a proportion of the lead output in the United States, pending the final completion of the Marysville smelter.

At Rossland production is steadily maintained. The number of working mines is also increasing, the Iron Mask having been added to the list. It is reported that important improvements are to be made at the Northport smelter. At present the ore is treated at a lower cost than ever before, but the proposed alterations to cost about $25,000, it is expected, will introduce still greater economy.

It is reported that the high-grade ore shoot northeast of the main shaft of the Le Roi, and locally known as the Peyton vein, has again been cut at the 150-ft. level. At the Giant the workings are to be surveyed, with a view to exploration work by the diamond drill.

About Nelson more miners are employed than for some years past. At Ainsworth camp operations have been resumed on the Highlander and No. 1 mines. At Sandon, in the Slocan Star in No. 5 tunnel, the Silversmith vein is reported cut at a depth of 250 ft. below the old workings. At Erie, during June and July, eight carloads of ore were shipped from the Arlington, giving reported net smelter returns of $6,953. The lease on the property has now terminated. The Lucky Jack group of three claims in the Poplar Creek district is reported purchased by W. B. Pool, for $45,000 in cash and 45,000 shares in a company to be formed. At the Waterloo mine, at Camp McKinney, another clean-up recently resulted in two gold bricks, valued at $5,120. The mine has thus produced from milling operations over $8,000 in about 40 days, and returns on shipments to the Trail smelter are reported to give a further $3,639 net. On Spruce creek, in the Atlin district, a rich pay streak has been encountered on No. 85.

The Texada Island branch of the Western Federation of Miners has peremptorily demanded for the employees of the Marble Bay mines an increase in pay and a reduction in hours, saying that on and after August 11 the union schedule of hours per shift for surface would be: Topmen, eight hours per shift; carpenters, blacksmiths and teamsters, and all other surface laborers, nine hours per shift, present wages to be the schedule. The manager inquired whether wages and hours at the Marble Bay were not the same as those in other parts of the province. but the union merely repeated its demand, and the mine, which has been a regular producer for the past three years, closed down. The Western Federation of Miners is none too popular in some sections, as the Nanaimo coal miners' union the other day rejected a motion to surrender its charter by a very narrow margin, 194 out of 309 miners present voting for the motion.

In the Boundary there is now an adequate supply of fuel for the smelters. At Boundary Falls both furnaces are in commission, as are those at Greenwood.

In the Cariboo district, where hydraulic work is largely dependent on heavy winter snowfalls, the Consolidated Cariboo, the largest undertaking of its kind in Canada, has made but a relatively insignificant clean-up, the value being placed at approximateiy $50,000, compared with $300,000 three years ago, when water supply was good. It is likely that the company will have to make provision to be more independent of the seasons in the future.

San Luis Potosi. Aug. 18.

(From Our Special Correspondent.)

Several serious problems are confronting the Mexican miner, and it would seem that two things were necessary—the building of more smelters and a stable exchange for the currency. Production is exceeding the capacity of the smelters, and the plants are overburdened with ore, particularly siliceous ore. The San Luis Potosi smelter does not care to make any new contracts, and refuses to receive siliceous ores except from mines having contracts; while at the Aguas Calientes plant, of the American Smelting and Refining Company, practically the same condition exists, and the smelter is putting off the making of new contracts. It is feared that if new charges are made they will be much higher. At all other customs smelters, the absence of argentiferous high iron oxide or sulphide ores is noticeable. The other hardship to the producer is the government authorizing the railroads to raise freight charges, because of the long continued high exchange, to 15 per cent above the present rate, on all articles except corn, wheat, cotton, firewood, charcoal, coal and commodities for export. It is understood that the agents of the Mexican Central, Mexican National, Interoceanic, and Mexican Railroads have been instructed to take full advantage of this grant on and after September 1. Whether the overloading of the smelters is due to labor troubles, or an actual lack of capacity, can not be accurately ascertained. The immense amount of construction by the Mexican National and the Mexican Central may have some bearing on their desire to increase charges, and their lines into Guadalajara may help solve the smelter question, as a smelter for Guadalajara has received considerable attention.

On the west coast in Sinaloa the newly organized Gibson Mining Company, a Chicago concern, is preparing to open up some recently discovered gold ledges. At San Jose de Garcia, La Purisima is producing heavily, and negotiations are pending for its sale to an American company. The San Rafael of Fernando Pena is working on a large scale. A rich strike is reported from the Tescalana mine of Alejandro Lazatal. In Sonora, at Zubiate the 140-stamp mill is completed. The copper properties of the Transvaal Mining Company, a Cincinnati concern, are reported opening up a very rich ore body. Phelps, Dodge & Co. have taken 400 Chinese to Nacozari to work in the mines. At Alamos the Santa Fe Gold and Copper Mining Company, a branch of the International Gold and Copper Mining Company, of Chicago, has under the superintendence of C. F. Tolman, taken up 4,000 pertinencias. It is undertsood that the Colorado Fuel and Iron Company, of Denver, is after all the good iron deposits in Sonora.

In Michoacan, a rich copper strike is reported from Tinquindin. La America, a company with capital of $150,000 Mexican, C. W. Lawson, president, and C. A. Lawson, secretary, is said to be already on a rich vein in Tlalpujahua. The Lill Mining Company, $300,000 Mexican, Albert Hohenthal, president, and Guido de Voltaire, manager, has ordered machinery for its property in Tlalpujahua. At the Concepcion de Oro, of which W. W. Graham is president, the pumps started August 1, and the water is being lowered from 6 to 8 ft. a day. A mill is being erected. In the new shaft of La Noche Buena rich stringers of gold and wire silver were struck last week, but the shaft will be deepened before the crosscut to the vein is started. In the twin camp of El Oro, state of Mexico, the Reliance Company, is building a mill for itself and the Old Abe and Old Abe No. 2, all having practically the same stockholders. A new company, La Nacional, is preparing to unwater the old properties acquired by it. At the Victoria, west of the El Oro, the 3-compartment shaft is down 331 ft., and prospecting by cross-cuts has been resumed; as soon as the Cameron station pump, ordered, is placed, sinking will be resumed. El Oro Mining and Railway Company has finished the survey of its extension to Tlalpujahua, a distance of about 6 miles, and will probably soon build to meet the demand of the Victoria, the Dos Estrellas, and numerous other new mines of Tlalpujahua. At the meeting last week of La Esperanza Company, the Guggenheim Exploration Company held all but 6 shares, and reduced the number of directors from 5 to 3, electing its own men to the directorate, among whom was Mr. H. M. Deiffenbach.

Exchange on New York continued during the week ending August 15 downward, selling Friday and Saturday at 225. The dealing in mining stocks is becoming so active that a stock exchange will probably be established. The favorite stocks remained about as formerly, Dos Estrellas bringing $3,560; Jupiter, $30; Victoria, $435; Old Abe, $50; La Union, $135; Aldebaran, $200; Noche Buena, $45; Antares, $77; Aurora, $42; Soledad, $445; San Rafael, $1,420, and Augustias of Pozos, Guanajuato, $105.

London. Aug. 15.

(From Our Special Correspondent.)

The history of the King Prempeh Treasure Mines, Limited, which is about to be wound up, is an interesting one, as it affords an example of a mining man openly denouncing the promoters and the *soi-disant* engineer on whose report the flotation was effected. This company was formed just two years ago to acquire from the London Ashanti Syndicate certain properties in west Africa that were supposed to have been the source of King Prempeh's riches. The syndicate had obtained them from a Mr. John Fitz-Townsend, who was supposed to be a mining engineer of experience. As he claimed to have passed through the Ballarat School of Mines and to have been in the employ of an eminent Australian firm of mining engineers and metallurgists, whose name need not be mentioned here, it was taken for granted that his reports on the properties were entirely reliable, and they were in fact the basis on which the company was floated. The venture seemed a promising one and a large amount of working capital was subscribed, one of the largest contributors being a member of the family of Vickers, of Vickers, Son & Maxim. Mr. Edward Hooper was a director and also consulting engineer, and the directorate included other men with experience in the management of mining companies. Mr. Fitz-Townsend undertook the duties of managing

the properties and proceeded to west Africa. Before twelve months were out the directors and leading shareholders had reason to be dissatisfied with the condition of affairs, and it was decided to appoint an independent man as mining engineer. Mr. Hooper therefore recommended Mr. N. Samwell and he was appointed to the position a year ago. On his arrival on the spot it did not take Mr. Samwell long to find that the representations in Mr. Fitz-Townsend's reports could not be substantiated, and, in fact, Mr. Fitz-Townsend, who was with him during the first two months, was quite unable to point out the alleged rich veins. There was no alternative before Mr. Samwell but to advise his directors to shut down all work and after some further investigation and discussion the directors decided to take his advice. The properties are therefore to be handed back to the promoting syndicate and the company wound up. The promoting syndicate and Mr. Fitz-Townsend are naturally furious at this exposure and have made searching inquiries into the history of Mr. Samwell, with a view of finding some weak point that would help them to cast doubts on his reliability. When people want to impute any fault of character to others they have a tendency to think first of their own particular weakness. So in this case Mr. Fitz-Townsend thought they might find that Mr. Samwell had a bad record. As a matter of fact, Mr. Samwell has an excellent record as a mine manager in Australia, Malay and the Dutch East Indies, and comes of a good Cornish family. On the other hand, Mr. Fitz-Townsend's claims that he went through the Ballarat School of Mines and had been in the service of the eminent Australian firm cannot be substantiated, nor does he appear to have ever held any position, responsible or otherwise, in connection with the management of a mine. I have written thus candidly because it is only fair that a professional man who courageously tells the truth about a mine in the face of angry promoters and their tools should be defended and the real truth of the case made public.

Last week I mentioned that some of the lower class papers in London have been anticipating the trial of Mr. Whitaker Wright by publishing personal attacks. One of these papers has been brought up for contempt of court, and the writer, Mr. Arnold Wright, fined £100. As he declined to pay the fine, he has been lodged in jail. The curious point of the affair is that it is laregly due to Mr. White's journalistic efforts that sufficient funds were subscribed to provide for the costs of the prosecution. He should have been content with this excellent service without trying to conduct the trial in the columns of a newspaper. His action may easily be construed as being the result of personal spite, and the defence will naturally make the most of this construction. In England the law against the issue of public comment on a case *sub judice* is strictly enforced, and it saves the necessity of challenging jurors. The present case is not whether Mr. Whitaker Wright is an unprincipled adventurer in the company-promoting line, but whether he has technically infringed a law (for these two things are very different), and the introduction of personalities only confuses the issue.

Perth, W. A. July 6.

(From Our Special Correspondent.)

The gold yield of West Australia State for June was 208,059 oz. The estimated value at £3 12s. per oz. is £749,014, the fine content being 176,323 oz. This good return is the third highest recorded in the history of the colony and brings up the returns for the six months ending June 30 to 1,221,755 oz. The total yield of gold since 1886 has been 11,196,221 oz., value £42,068,645.

Kalgoorlie.—It is announced that the Great Boulder Company has requested Mr. Hamilton, its general manager, to visit London, and it is probable he will leave here at the end of this year, traveling via America to make some personal inquiries on the latest methods there. The Great Boulder Company is making preparations for some prospecting that will be of interest to the Great Boulder Main Reef Company. In Lane's shaft, which is close to the Main Reef boundary, it is intended to put a diamond drill at the 1,000-ft. level to test the country near the south and north boundaries of the Horseshoe and Chaffers.

The rich body of telluride and free gold ore on the 1,000-ft. level has been opened for over 100 ft., and is nearly 20 ft. wide in places. Present indications are that it underlies the Horseshoe boundary lode and it should join at a greater depth the Great Boulder's main lode.

In addition to this find, the diamond drill in Jansen's shaft has cut the extension of the Ivanhoe east lode at a vertical depth of 1,060 ft. and at a point 100 ft. south of the Boulder No. 1 Company's boundary.

The Golden Link reports ore at the 1,300-ft. level. For some years this mine has been battling with difficulties; the flow of water hindered the sinking of the main shaft, but work has been pluckily carried on and the general manager has continually urged the prospecting at lower levels.

For some time driving on the Consol's lode at the 1,300-ft. level has been in progress and developments along the lode show that the Consol's lode joins the Perseverance at about 280 ft. south of the Consol's boundary. The width of the ore body at the junction is 18 ft., and the average value 14 dwt. per ton. This discovery is of value, and should be of importance also to the Lake View Consols. Some payable ore was met at the 930-ft. level of the Golden Link, and this was opened for 500 ft. south. Development work since has shown the country much broken down to the 1,200-ft. level; below that the shaft passed into settled country. The Lake View Consols encountered the same barren zone and has decided to prospect to 2,000 ft. The Golden Link is preparing to open out at the 1,400-ft. level and exploit the lode. On the Eclipse lease the manager estimates he has two years' supply of oxidized ore above the 100-ft. level in sight.

At the Lake View Consols the managers state that at the 1,000-ft. level a cross-cut driven 346 ft. west 1,125 ft. north of the main shaft, has cut the Perseverance lode. This ore had already been opened 575 ft. north of the shaft at the 1,000-ft. level, where a winze produced ore worth 2 oz. 15 dwt. per ton for a width of 3½ ft. Now 2 ft. of rich ore has been cut 550 ft. north of that point. The general prospects of the property are much improved of late.

The Associated Northern has resumed shipments of ore to the Dapto smelters. Considerable diamond drill work is going on to test the western part of the property at the fourth level.

The Hainault is about starting the new tailings plant and additions are being made to the air compressor plant. The main ore bodies are opening well at all points. At the 650-ft. level good ore is being stoped in the south end over a width ranging from 8 to 25 ft.

Sydney, N. S. W. July 21.

(From Our Special Correspondent.)

New South Wales.—There has been no rain at Broken Hill, except a few light showers that could not be recorded. The South Australian Government has undertaken to convey 800,000 gals. per week by train to Cockburn, on the border, for 12s. 6d. per truck load of 1,200 gals., while the Silverton Tramway Company will carry the water from Cockburn to Broken Hill, 300,000 gals. per week free for domestic purposes and 500,000 gals. per week for mining purposes, at the rate of 4s. per truck load, which comes to a total of 12s. 6d. per 1,000 gals. delivered at Broken Hill. The New South Wales Government will sell the water at 5s. per 1,000 gals., a loss of 7s. 6d., to enable the mines to find work for men, whom otherwise the Government would have to support. The New South Wales Government pays half the cost of fitting up the trucks with three 400-gal. tanks each. The domestic supply will be drawn from Silverton in the near future, when all the South Australian water will be available for the mines. The New South Wales Government is also assisting by granting £1,000 for the erection of condensers at the mines. The nest of condensers erected by the Proprietary mine consists of 36 tanks, each 6 ft. in diameter and 20 ft. high, condensing the steam from the various engines, which is cooled by mine water from the Acacia blocks, three miles away, the mine water being subsequently used at the concentrating mill. The loss of water for the Babcock & Wilcox boilers is made up by condensing steam from three Lancashire boilers. This arrangement has enabled the management to put on the full complement of hands. The train water is divided between the South, Central and Block 10 mines. The Central requires 100,000 gal. per week to keep one shift going. The magnetic separation plant is doing satisfactory work, three shifts a day. Block 10 requires 200,000 gal. a week to keep two shifts going. The British mine has started erecting a condensing plant.

The Malacca diamond mine, near Inverell, has started work again. A few men have been put on, pending instructions from England.

Trouble has been experienced at Brown's colliery on account of the introduction of coal-cutting machines. The fillers were formerly paid 7s. a day for filling 12 skips, but by the use of machines 15 or 16 skips are ready for each shift. Ten fillers and wheelers have refused to perform the additional work.

Auckland, N. Z. July 29.

(From Our Special Correspondent.)

Hauraki Gold Field.—During the past three weeks the chief returns were: Waihi, £52,209 ($261,045), from 18,844 tons; New Zealand Crown, £6,897 ($34,485), from 3,150 tons; Tairna Broken Hills, £2,210 ($11,050), from 650 tons; Royal Oak, £1,018 ($5,090), from 633 tons.

At Waihi a large and rich quartz lode has been cut in the borehole from the 500-ft. level of the Grand Junction mine. According to latest advices, the bore has penetrated 202 ft. of lode matter. The exact thickness of the lode cannot, of course, be determined, but it is almost certainly a continuation of the Martha Lode (well known as the main reef of the Waihi mine), which dips against the borehole and strikes nearly at right angles to its line, so the thickness is probably not less than 100 ft., and may be more. The core assays have ranged from £6 to £11 10s. per ton. It may be mentioned that in the Waihi mine the Martha lode increases in size with depth, and is in the lower levels of the eastern part of the mine considerably over 100 ft. thick, the greater part being highly payable ore.

Waihi.—The last return of £52,209 from 18,844 tons, equal to £2 15s 5d. ($13.40) per ton, is only what the public now expects from this great mine. The various ore bodies continue to open well, and there can be little doubt that the mine will be a large bullion producer for many years. Large bodies of rich pyritic sulphide ore exist in the lower levels, particularly in the eastern part of the Martha lode. For some hundreds of feet longitudinally and vertically the footwall part of this lode is highly mineralized quartz rich in gold and especially in silver, whilst the hanging wall portion, which is also payable and often rich, consists of oxidized ore. In the lowest level, however, the sulphide ore has gained considerably upon the oxidized ore. As bearing on the discussion which has lately appeared in the columns of THE ENGINEERING AND MINING JOURNAL under the heading of "Water in Mines," it may be mentioned that the Waihi Company is at present pumping 550-600 gal. (English) per minute from about 500 ft. below the drainage level of the surrounding country. Down to 200 ft. below this level the amount of water encountered increased, but below that point it has remained fairly constant, except that at each new level there was for a time a very large increase, caused by the drainage of open fissures and cavities in the reef system.

GENERAL MINING NEWS.

ALASKA.

(From Our Special Correspondent.)

Much freight is reported tied up at St. Michael, on Norton sound, because the river is too low to send it up to Dawson by steamers. The water this season has been lower than for years. All the steamers on the lower river are to be pressed into service for freight as soon as there is water enough for them to get up. Otherwise supplies may be scarce this winter on the upper river.

Around Nome a great many people who arrived there this spring are now scattered throughout the country. Labor is $3 per day. The Solomon river country seems to be showing up pretty well. In and about Nome work did not begin until the first of August, as the season was late.

ARIZONA.

(From Our Special Correspondent.)

The labor situation in parts of Arizona does not seem to have improved much of late and a solution of the problem is as far off as ever. The operators have offered a wage scale which they think should be satisfactory and a conference is to be held in hope of coming to some understanding. An Arizona Labor Federation has been formed, backed by the Western Federation of Miners.

COCHISE COUNTY.

Gold Treasure.—A 20-stamp mill is on the way to this mine in the Bisbee district. H. M. Whitney has been appointed superintendent.

GRAHAM COUNTY.

Shannon Copper Company.—A circular issued by the company states that it continues to reduce about 450 tons of ore a day, producing from 15 to 18 tons of fine copper every 24 hours, seven days in the week. The works were shut down only three weeks in June. The mine is being developed very satisfactorily, and the tonnage of ore in sight is constantly increasing. a large ore body was found in the Black Hawk No. 3 tunnel, and more recently, a nice streak of ore in the Carter tunnel, the lowest workings of the mine. The company says that on August 1 it delivered to the Boston Safe Deposit and Trust Company 60 $1,000 bonds, or $60,000, for cancellation, the company being obliged to purchase not less than 60 bonds annually until the bonded indebtedness of $600,000 is paid. The bonds have been purchased at private sale.

(From Our Special Correspondent.)

Shannon Copper Company.—This company, at Clifton, will build another concentrator.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Altata.—This property near Chloride has been examined for a Chicago company. The mine is worked by two leasers.

PINAL COUNTY.

(*From Our Special Correspondent.*)

Christmas Gift.—This mine, at Casa Grande, has been bought by the Platt-Cohen Mining Company, of Denver, Colo.

Copper Buttes Company.—This company, with properties near Kelvin, has 12 men sinking a deep shaft.

Troy-Manhattan Copper Company.—At Troy the Alice tunnel is being driven to cut the vein at 800-ft., and will be over 1,500-ft. long. The reduction works are to be built on the Gila river, near the surveyed line of the Prescott & Eastern Railroad. J. W. Sisson, of New York, is president of the company.

SANTA CRUZ COUNTY.

Santa Rita Copper Company.—This company's property in the Santa Rita mountains is being developed under superintendent I. H. Gould.

(*From Our Special Correspondent.*)

Ragnarok.—This group of mines in Oro Blanco district was recently taken over by E. L. Foster, D. H. Jennings and J. T. Quinlan, of Bridgeport, Conn., who are developing the property and putting in mill machinery.

YUMA COUNTY.

(*From Our Special Correspondent.*)

Belle of Arizona Group.—This group of eight quartz and placer claims near Quartzite, in the southwestern portion of the county, has been bonded by W. M. Kellogg, of Hartford, Conn.

Ward Group.—G. W. Middleton, of Prescott, has bonded this group of four claims near Harrisburg and Cunningham Pass, and let a contract for driving 300 ft. of tunnel.

War Eagle Group.—This group of 16 gold claims near Harrisburg is now owned by R. F. Linterman, F. C. Smith and R. Dunlap, of Chicago, who have incorporated a company under the Arizona laws.

CALIFORNIA.

AMADOR COUNTY.

Moore.—Capt. W. A. Nevills, owner of this mine at Jackson, is said to have timbers ready to retimber his mine to 500 ft. depth and to open it, but delays the work on account of the present attitude of the local labor unions.

BUTTE COUNTY.

American Gold Dredging Company.—The pit for the new dredger of this company, at Oroville, F. S. Mayhew, manager, has been excavated, and the construction of the machine will shortly start.

Golden Trout Mining Company.—In the superior court at Oroville in the matter of F. H. Greeley vs. the Golden Trout Mining Company, a return of sale by the sheriff was filed, showing the sale was made to plaintiff for $1,380, the amount due.

CALAVERAS COUNTY.

Easzy Bird.—This mine at Mokelumne hill, owned by the Emma Mining Company, of Boston, Mass., H. L. Luston, manager, has had to close down for lack of water. The new mill has just completed a first run which is reported as satisfactory.

Fannie Marie Mining Company.—Operations are shortly to be resumed on the Fanny Marie and Bluejay mines at Glencoe. Chas. H. Blake, superintendent.

Maltman.—Good ore has been struck in this claim at Angels, at a depth of 200 ft. A mill test is being made. A plant for oil burning is being put in.

Rockingham.—Some rich ore has been struck in this mine at Glencoe, C. A. Berry, superintendent. The sulphurets are also rich.

FRESNO COUNTY.

Apache.—This company has struck the ledge for which it has been hunting so long. A mill is contemplated.

KERN COUNTY.

Associated Oil Companies.—This concern has its immense oil reservoir completed. All the product is being sold under contracts, for which it has not oil enough, so drilling is active in that field just at present. The demand for fuel oil is daily increasing.

MADERA COUNTY.

Jessie Bell.—Gold values have been found in the ore of this copper mine, so that the Los Angeles company owning it have sent in rock crushers, Huntington mill and concentrators, etc. The mine is in the Daulton section.

NEVADA COUNTY.

Junction.—This mine, near North San Juan, has been bonded to San Francisco men and is to be opened and equipped.

Last Chance.—This mill on Diamond creek has started, as the mine is yielding a good grade of ore.

Lecompton.—A 2-ft. ledge is reported in this mine, near Nevada City, W. H. Dunlap, manager, at a depth of 425 ft. A new plant, consisting of hoist, pumps and mill, was recently installed.

Menlo.—A cross cut started at the 1,400 level on the Omaha some eight months since has struck the ledge in the Menlo claim. Geo. W. Starr is manager. The ledge is from 15 to 18 in. wide and this development practically opens a new mine.

Oro Fino and Hercules.—On these mines in Meadow Lake district, owned by J. P. Clark and F. J. Cook, a 10-stamp mill is to be erected.

Pennsylvania Mining Company.—This company has paid its second dividend of 10c. per share since its reopening.

Rose Hill.—The old dumps of this mine on Winchester hill are to be worked over. Only high-grade ores were crushed in early days and the 5,000 tons on the dump, in Grass Valley, are now considered valuable.

San Francisco and Eastern Railroad.—Surveyors are working between Grass Valley and Lincoln for this road, of which C. L. Wilson is promoter. It is the intention to put up a large smelter on the line between Lincoln and Bear river.

Sierra Queen.—This Grass Valley mine closed down recently at Grass Valley after upward of $20,000 had been spent. Crandall & Briscoe, of San Jose, Santa Clara county, who have a large block of treasury stock, intend to work the property, which paid well for many years.

Union.—This blue gravel mine near North Bloomfield has started to crush cement gravel in its new mill. A. D. Gassaway, the superintendent, thinks it will take 75 miners to keep the 20 stamps busy. The tunnel is about 5,000 ft. in length, and the gravel is hauled out by a small locomotive.

SAN BENITO COUNTY.

Cerro Bonito.—This quicksilver mine reports a new ore body 650 ft. from the mouth of the tunnel at a depth of 400 ft. The find is in the stope worked 30 years ago. Thos. Flint, Jr., and others have been working the mine during the past year.

SAN DIEGO COUNTY.

Julian Consolidated Mining Company.—This Los Angeles corporation is working 15 men on two of its properties at Julian—the Helvetia and High Peak, both of which were discovered as far back as 1870. A 2-compartment shaft has been started on the Helvetia and good free milling ore is being taken from the High Peak. Some telluride ore is found in the Helvetia.

Lepidolite.—A company has been formed in New York to take over the lepidolite mines near Pala and more extensive developments are to be made. The best grades carry from 10 to 12 per cent lithia. Frank Salmon has a number of men developing the deposits.

SAN LUIS OBISPO COUNTY.

Polar Star.—This old quicksilver mine near San Carpajo is being reopened by Bradford and others, of San Jose.

SHASTA COUNTY.

Borrasa Placer.—The Land Office fight over the title to this claim, between J. A. Kahny and Walter P. Rusk, has finally been decided on a rehearsing before the Secretary of the Interior, in favor of Kahny. The ground is supposed to be worth about $10,000.

De Lamar Smelter.—Another furnace for the Bully Hill Company at Winthrop is to be constructed. The contract has been let for the brick and the machinery has been ordered. This will give capacity for 300 tons of ore daily instead of 150 tons as at present. A number of open air roast heaps are being built at the mine. Tunnel No. 2 to the stopes is being enlarged to accommodate a double track.

Gladstone Mining Company.—About 75 men have quit work at this mine at French gulch, owned by the Hazel Mining Company. J. O. Jillson is manager. The miners demanded shorter hours, better meals and ampler sleeping accommodations. Mr. Jillson believed the men were treated fairly, and refused to comply with the demands after 10 days' deliberation. The men have been working 10 hours day shift, and 9 hours night shift. Mr. Jillson says he offered to grant shorter hours, but insisted time should begin when the men began work.

Liberty Group.—The Great Western Gold Company denies the right of E. F. Adams to bond this group of mines at Copley, to Philadelphia people, alleging that the group was originally bought by the Great Western Company, Mr. Adams transacting the deal. The company has instituted proceedings against E. F. Adams and Henrietta Adams to quiet title, and the suit is still pending. The courts will doubtless decide the question. The bond was to Wm. H. Day, John B. Watterman and Thos. F. Gates, of Philadelphia.

Loraine Group.—David Endicott has consolidated 41 quartz mining claims in Flat creek district.

SIERRA COUNTY.

Corotoman.—The principal owner of this mine at Forest City, has decided to discontinue work.

Sierra Reina.—At this mine (formerly the Kenton) near Allegheny, 17 men are now employed on development. The mill is being run night and day.

SISKIYOU COUNTY.

Lucky Strike.—John T. Lewis has sold for $3,000 his half interest in this mine on Cow creek, tributary to Russian creek, to his partner, W. H. Overton. Most of the ore so far worked has been crushed in a hand mortar.

SONOMA COUNTY.

Culver-Baer Quicksilver Mining Company.—The new 25-ton double furnace of this mine is in operation, and the company is now marketing quicksilver. Frank Beaumeister is superintendent.

Eureka.—At this quicksilver mine, Pine Flat, the furnace is to be reconstructed after the pattern of the Fitzgerald furnace at the Culver-Baer mine.

Sonoma.—A large Scott furnace is being built at this quicksilver mine, at Pine Flat. A. Abbey is manager.

STANISLAUS COUNTY.

The supervisors of Stanislaus county have appropriated $12,000 as a bonus to a combination of mining companies of the Red Mountain district to build a road from the mines to Westly, and to erect reduction works, and firebrick and tile factories at Westly. The combination is composed of the Martel Mining Company, owner of the Red Mountain district magnesite quarries; the James Manganese Mining Company, and the Phœnix Quicksilver Mining Company, of which E. P. Newhall and Alvinza Hayward are the owners. The companies agree to build the road and erect the works and factories at a cost of $100,000. The work is to be pushed ahead immediately. The magnesite people expect to employ over 100 men, and the quicksilver mines a larger number.

TRINITY COUNTY.

Rush Creek Mining Company.—On this property near Minersville, two tunnels are being run and development work is being rapidly pushed.

Three Peaks.—At this mine near Dorleska, owned by the J. J. Chambers Mining Company, a good body of rich ore has been found near the old shaft. The new stamp mill has started.

TUOLUMNE COUNTY.

The State Mining Bureau is about to issue a new mining map of Tuolumne county, together with a register of the mines, mills, etc. This register will give exact location of each mine, record of developments, names and addresses of owners, etc.

Dutch Mining Company.—At this mine, at Quartz, the shaft is down 1,400 ft., and men are drifting on the south level. The vein is 12 ft. wide. The mill is running full time.

Hallock Group.—Nelson Hallock has sold this group at White River to C. B. Rogers, of El Paso, Texas. The group includes the Bald Mountain, Richelieu, Ninety-Nine, English and Eclipse. The claims are to be developed at once, and a small cyanide plant, pumps and machinery are to be supplied.

Georgiana.—This mine, on the east mother lode belt, has been bonded to Chas. Holland and others. It was formerly known as the Garfield.

Telegraph Hill.—In this mine, a few miles from Sonora, a well defined vein of good grade rock has been developed, and a hoisting and pumping plant is to be put up.

Vivian.—This mine is under bond to W. S. Wilhelm, who is running a tunnel to tap the vein.

YUBA COUNTY.

Blue Point.—The sale of this mine at Smartsville to St. Louis men, carries with it 30 miles of ditches. The new owners are to put in a plant for working the cement gravel.

Strawberry Valley.—The J. C. West mine, near this place, is still producing after 20 years' work. The Boyce & Drake gravel mine is turning out well. J. H. Robertson is running a tunnel into old hydraulic ground in order to drift out the remaining gravel. The Berry mine and the Onken are both idle.

COLORADO.

BOULDER COUNTY.

Lottie.—C. P. Campbell and H. J. Newman, of Colorado Springs, are reported developing a rich vein on this property.

White Crow.—It is stated that this mine, near Sunshine, has been purchased by New York men.

CLEAR CREEK COUNTY.

Gem Consolidated Mines Company.—The new section of the water-driven electrical plant is in operation. This gives an added 300 h. p., making 600 of the 1,000 h. p. capacity water propelled. Light is furnished by the plant to the city, and power to the mines nearby. D. W. Carr is superintendent.

LARIMER COUNTY.

Grand Republic and Mount Zirkel.—These two copper mining companies are to break ground shortly for a concentrating plant in the Pearl camp. President McGuire is in charge.

MINERAL COUNTY.

Corsair.—This mine at Sunnyside, near Creede, is reported shipping 25 tons of ore a week.

Humphreys.—This mill, near Creede, has resumed operations after a temporary shut-down for overhauling and repairs.

MONTEZUMA COUNTY.

East Mancos Gold Mining Company.—This company at Mancos, will install an aerial tramway from the mine to the summit between Montezuma and La Plata counties. The ore will be hauled thence by teams to the railroad.

PARK COUNTY.

Wist.—This mill at Montgomery is being fitted with water power, also with a cyanide vat, for experimental purposes. A. A. Bissell and associates own the plant and are operating ore properties on North Star mountain.

RIO GRANDE COUNTY.

Summitville.—Ex-United States Senator Bowen has sold to Philip Schuth 174 acres of patented mining land at this place for $20,000. Schuth has already built a cyanide mill. He intends to lease in small lots the land which he has just acquired to miners and will treat the ore at his mill.

SAN JUAN COUNTY.

(*From Our Special Correspondent.*)

Brooklyn-New York.—Shipments to the Durango smelter have increased to two carloads per week. A large amount of second class is being treated at the Burro Bridge mill.

Champion No. 2 Group.—This group of five claims on Sultan mountain, formerly owned by the Notaway Gold and Copper Mining Company, was recently sold at trustees' sale to Joseph Bordeleau and Andrew Johnson, both of Silverton, for $21,140.

Conger Group.—A rich strike is reported and preparations are being made to begin shipments. This group consists of eighteen claims on Boulder creek.

Copper King.—Surface work has been abandoned and a crosscut is being run to cut the 25-ft. vein opened.

Emma.—This property in Ice Lake basin has been sold by its owner, Geo. Lacey, of Silverton, to a Nebraska syndicate for $40,000. The sale includes a small stamp mill, mill site and water right.

Gold Prince Mines Company.—This company, recently organized, with headquarters at Waterville, Me., is capitalized at $3,000,000. The directors are: E. J. Lawrence, Fairfield, Me.; Henry M. Soule and Louis E. G. Green, Boston; Mayer Gallert, Ellsworth, Me.; Mark Gallert, Waterville, Me.; Julius T. Whitlock and John D. Chipman, St. Stephen, N. B.; Fred A. Jones and John H. Thompson, St. John, N. B. E. J. Lawrence is president and W. Z. Kinney, of the Gold King Mines Company, Silverton, superintendent. The company is operating claims in Mastodon gulch.

Ouray Prospecting Company.—A group of five claims near Silverton is being developed, and one, the Rambler, has disclosed a 28-in. streak of smelting ore. Several carloads are broken, ready for shipment.

Royal Mining Company.—The Mazeppa vein has been cut in the King tunnel, near Silverton, at 1,450 ft. from the adit, and shows 5 ft. of mineralized quartz. The tunnel is being continued 700 ft. further to cut a large porphyry dyke.

Silver Bell Group.—This group of five claims has just been sold by Hill & O'Malley, of Silverton, to Slattery & Cunningham, for $4,000 cash. A crosscut will be run 160 ft. to cut the vein.

SAN MIGUEL COUNTY.

Butterfly-Terrible.—These mines near Ophir Loop have been making a very favorable showing. The estimated output for August with no interruption was $20,000. The 30-stamp mill is crushing 100 tons daily. The ore is free milling and a two years' supply is said to be blocked out. J. F. Keating is manager.

Mayflower.—President Wilfley, of this company, has 25 men at work. A mill and tram line are to be installed.

Yellow Mountain Mining Company.—About 25 men are at work and the 10-stamp mill is treating 30 tons daily. The company's property includes the Carribean-Montezuma group, near Ophir.

SUMMIT COUNTY.

Cashier.—This mine and mill, besides the gold saved on the plates, is making about three cars of concentrates a week.

Gold Belt.—A strike of gold ore is reported at this mine, near Kokomo, in Mayflower gulch.

Gold Pan.—This company has closed down its placer workings for the season, owing to scarcity of water. During the season about 2,000 cu. yds. of gravel have been worked every 24 hrs. for each of the two elevators.

Washington.—The concentrates from this property on Nigger hill are said to run upwards of $25 per ton. The mill is running day and night.

TELLER COUNTY—CRIPPLE CREEK.

Blue Flag.—This company will install two 80 h. p. boilers and put in machinery during September on its property located on Bull Hill.

Molly Kathleen.—A local paper reports that C. Boll, who has a lease on this property, is to erect a 100-ton cyanide mill.

(*From Our Special Correspondent.*)

Strike Situation.—The El Paso mine and the drainage tunnel have started work with a force of between 100 and 150 men from the district, though a few have come in from the outside. A number of the men are union men, though the union leaders deny it. The mine and the tunnel are strongly guarded by armed watchmen, and so far no trouble has occurred. The men are housed and fed at the mine. Several other mines are reported ready to start soon, among them the Ajax, Golden Cycle, Strong, Gold King and Independence. It is known that quite a number of men are ready to work on these mines. A high board fence is being erected around the Golden Cycle, but it is stated that this is to keep timbers and other property from being stolen. The Modoc on Bull hill is to start up in a day or two by the consent of the union. The demand of the union is that before any mine can start it must agree to ship to a mill designated as "fair," must employ none but union men and that the union secretaries of the union must be allowed to examine the cards of the men every month. The mine owners are organized with headquarters at Cripple Creek and are prepared to resist the demands to the last. The union leaders are apparently equally determined, though there is undoubtedly much dissatisfaction among the men and some think that the leaders will not be able to hold them in line long.

C., K. & N.—It is rumored that this Beacon Hill property has started work again. The property has been shipping to the Dorcas mill, which was recently declared fair by the union. The property is worked under a lease.

Portland Gold Mining Company.—So far as this property is concerned the strike has been declared off, it being understood that Mr. Burns has acceded to the demands of the union. The mine will probably start up in a day or two. Just what effect this will have on the settlement of the strike is not known. Some think that this will tend to prolong the strike, as the opening of the Portland will be considered a victory for the Federation and will encourage the miners to hold out, with the hopes of getting other favorable settlements. However, from appearances it seems as though the majority of the mine owners in the district will never submit to the demands made.

BY TELEGRAPH.

The strike situation at Cripple Creek remains quiet and unchanged. The Portland mine is preparing to work a full force, employing both union and non-union men. No more mines have resumed work. The carpenters who were building a fence around the Golden Cycle property were called off by their union. There are no signs of the end of the strike. The mine owners at a recent meeting in Colorado Springs agreed to stand together and fight the strike to the end.

IDAHO.

BOISE COUNTY.

Checkmate.—This mine, Sam. Carhart, president, is to install electric power.

ELMORE COUNTY.

Atlanta Mines Company.—The property of this company is to have a large stamp mill.

Big Lode Mining Company.—The battery of 20 stamps in this company's mill at Atlanta is to be started shortly.

Queen River Consolidated Mining Company.—A 10-stamp mill is to be erected by this company at Atlanta.

IDAHO COUNTY.

Thunder Mountain.—Local reports state that the wagon road to this point will be completed about the middle of October. A great many milling plants are waiting to be shipped in, but it is doubtful whether much of the machinery can be transported and housed before snow flies in November.

LEMHI COUNTY.

Gold Dust.—The machinery for this mine at Leesburg is arriving. It consists of a 10-stamp mill, an engine and boiler, sawmill and electric plant. O. E. Kirkpatrick is in charge.

Ima Consolidated Mining Company.—A flume and water wheel and later air compressor for power drills are to be installed. J. W. Taylor, of Salt Lake City, is manager.

SHOSHONE COUNTY.

Highland Chief.—Minnesota men, it is said, are to install an air compressor and a concentrator on this property in the Pine creek district.

Idaho & Eastern Mining and Milling Company.—Articles of this company, capital $1,000,000, have been filed at Wallace. The claims are near Burke, the principal place of business. The following are the incorporators: C. A. Williams, W. H. Herrick, J. Drew, J. W. Roundy, Wardner; W. Dow, Lane. With the exception of W. H. Herrick and J. Drew the incorporators have subscribed for 233,332 shares each.

ILLINOIS.

SANGAMON COUNTY.

(*From Our Special Correspondent.*)

H. C. Adams, of Chicago, vice-president of the Jones & Adams Company, operating mines at Springfield, and Catlin, has purchased the coal rights under the farms of H. D. Lyon, Robert W. Curry, Amelia Curry, J. S. and L. C. Francis, northeast of Springfield, on the Illinois Central Railway. The farms above mentioned make 718 acres in a nearly square block. Mr. Adams also has options for 4 months on 160 acres of coal adjoining, belonging to J. Conlon and J. Stremsterfer, and options for one year from Lyons and L. C. Francis along the Illinois Central right of way for sufficient surface for shafts, mine buildings and tracks, together with an option for 1 year for sufficient surface from A. Farr for a connection with the Wabash Railroad. There is adjoining this 600 or 700 acres more of coal right that can be had when needed. This will then be surrounded by the mines of the Springfield & Chicago Coal Company, Clear Lake Co-operative Coal Company, Springfield Coal Mining Company's No. 2 and No. 3 mines, The Republic Iron & Steel Company's mine and the Jones & Adams Company's mine.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

Calumet & Hecla.—At the annual meeting at Boston, August 19, less than a dozen officers and stockholders were present. The following directors were re-elected: Alexander Agassiz, of Newport, R. I.; Francis L. Higginson, of Boston; Francis W. Hunnewell, of Wellesley; Quincy A. Shaw, Jr., of Boston; James N. Wright, of Detroit, Mich.

(*From Our Special Correspondent.*)

Atlantic.—The frame shaft and rock house at shaft A was burned to the ground recently. It was built six years ago and contained two Blake rock breakers and a 200 h. p. Corliss engine. The total loss was $49,000, covered by insurance. The fire will curtail production somewhat. The force employed in A shaft will be distributed throughout the mine and the other shafts will increase their output.

Calumet & Hecla.—Rock shipments average about 5,750 tons daily. At the stamp mills at Lake Linden from 20 to 22 heads are in commission constantly. The remaining parts of the equipment of No. 13 shaft are being installed. This shaft is on the Osceola amygdaloid lode, but will be used in removing some ground on the Calumet conglomerate.

Osceola Consolidated.—This company has filed papers renewing its incorporation for another 30 years from August 28. In March there were of record 2,025 shareholders.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Mohawk.—Work on the new steel shaft and rock house at No. 4 shaft is well under way. A large force of men is employed by the Wisconsin Bridge and Iron Company, of Milwaukee, Wis. The stamp mill on Traverse Bay is treating 1,000 tons of rock daily.

Phoenix Consolidated.—The new one-head mill about one and a half miles from the mine will go into commission September 1. John R. Stanton inspected the property recently.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Adventure Consolidated.—About 70 men have been discharged and 10 power drills removed from drifting. Operations hereafter will be confined to stoping and sinking. Twenty-two power drills are in commission, 4 sinking and 18 stoping. Rock shipments average 650 tons daily. The rock is closely selected.

Mass Consolidated.—About 30 drills are in commission, 15 being engaged in enlarging the reserves. The Butler lode is yielding a large amount of mass and barrel copper. The greater part of the rock stamped comes from the Evergreen amygdaloid lode.

Michigan.—Rock shipments to the Mass Consolidated mill on Keweenaw bay will begin in October or November. A 2-mile extension of the Mineral Range Railroad is being run to the mine.

IRON—GOGEBIC RANGE.

Meteor.—Oglebay, Norton & Co., under corporate name of the Castile Mining Company, have taken charge of this mine. They have been exploring for some time on what was known as the Joliet, the 80 acres adjoining the Meteor on the west.

IRON—MENOMINEE RANGE.

Breen.—This mine at Waucedah, idle since 1880, is to be unwatered and reopened. It produced a siliceous ore. Emmet, an adjoining idle property, belongs to the United States Steel Corporation.

Buffalo & Susquehanna Iron Company.—This company has bought 80 acres of iron ore land at Iron Mountain.

Oliver Mining Company.—The decision to abandon the option on the Gibson property has been reversed and the exploratory work will continue. The Corrigan-McKinney Company was ready to take up the work had the lease been relinquished.

Riverton.—The settling of the shaft has caused the closing of this mine, near Iron River, until retimbered.

MINNESOTA.

IRON—MESABI RANGE.

A 40-acre tract northeast from Hibbing, was recently explored by M. L. Fay, who found according to his estimates, about 2,000,000 tons of a 57 per cent bessemer ore. This carried an output of 25,000 tons annually, and a royalty of 25c. a ton. He was able to make sale of this property for a cash bonus of $50,000, and an additional bonus of 5c. a ton on all ore mined, of the grade guaranteed, up to 1,500,000 tons. On the basis of 1,500,000 tons which the purchasers are willing to concede there may be in the mine, and reducing the $50,000 cash paid down to royalties on a 20-year term, the actual royalty to the final purchaser is 36.66c. per ton.

E. F. Sweeney has been operating eight drills on the Western Mesabi, but has reduced the number to six. When iron matters look more promising, the number will be increased again.

Arcturus.—Washing experiments bid fair to turn out well, and it is likely that the Standard Mining Company (W. P. Snyder & Co.) may take the property under their option for lease. The original options were all for a direct sale, but the last is on a royalty and annual minimum basis that is easier.

Chemung Iron Company.—The entire holdings of this company, including the Monroe and other partially developed mines, have passed into the hands of the United States Steel Corporation. The deal is significant, because this was the only large block of Mesabi ores left on the market, outside of the J. J. Hill ores. It will now be difficult without treating with several owners, and rounding up a lot of difficult interests, to get together enough Mesabi ores to warrant any large steel concern making investments. Some of the Chemung properties are capable of being mined by open pit, steam shovel and mining, some are underground. Some are bessemer, some non-bessemer, some especially easy for furnace requirements, and together they furnish an excellent range of ores, itself a factor of much value. The sale was made on the basis of advanced royalty, and was on terms favorable to the Steel Corporation. There are about 900 acres in these Chemung tracts, and their individual tonnage runs from more than 25,000,000 in the Monroe to less than 1,000,000 in some of those partly explored. Chester A. Congdon and Henry W. Oliver are the Chemung company. They have been gathering and exploring these lands for several years, and have paid especial attention to securing of ores easy in the furnace and of good grades. The average grade is better than that generally found to-day on the Mesabi.

International Harvester Company.—The principal property bought from the Deering Harvester Company is the Agnew, at Hibbing. A 25c. lease on it was secured by the Deering Company about a year ago for $150,000. This mine has now in sight over 6,000,000 tons of ore, half bessemer, and running about 61 per cent iron. It is an underground mine, and is shipping steadily. The next property in point of value is the Hawkins, in section 31 and 32, T, 57, R. 22, which has some 10,000,000 tons of about 56 per cent ore, largely non-bessemer. This is a 20c. lease bought by the Deerings for $525,000 last year, Hawkins is being stripped for milling, and a considerable tonnage is being shipped, though not so much as was expected. For these two properties and some small explorations at Crystal Falls, together with the only mine yet opened in the Baraboo, Wis., range, the International Company pays $3,500,000 in cash or its equivalent. The International Company has had an option on the properties for some time, and has been examining them. There may be an estimated 20,000,000 tons now shown up in the several properties, with an average royalty of about 20c. a ton. Reducing the cash bonus to royalties on basis of probable production in the customary way, the gross royalty to be paid by the International Company during the life of the mines cannot be much less than 60c. a ton on mines already opened and operating, and on the Agnew, at least, is probably considerably larger. The Hawkins is rather low grade, and contains an immense quantity of non-merchantable ore, not included in estimates. The Baraboo mines are probably quite wet. The price is probably a higher one than has generally been paid for Mesabi range properties.

MONTANA.

FERGUS COUNTY.

(*From Our Special Correspondent.*)

Montana Railroad.—The extension of this road to Lewiston is well across the county line. Grading is completed within 15 miles of Lewiston. Track laying is progressing at the rate of a mile a day. October 1 will probably see locomotives at Lewiston. This road will greatly aid the development of this county's mines, being the first to reach the county. The length of this line to the connection with the Northern Pacific at Lombard will be 155 miles.

GRANITE COUNTY.

(*From Our Special Correspondent.*)

Salmon.—After many years of idleness this old silver property which was one of the first to be worked in the 60's, is again producing. D. H. McDonald and L. N. Van Vranken are operating it under a lease and have shipped a car of ore which will average 200 oz. silver and 50 per cent lead.

LEWIS & CLARKE COUNTY.

(*From Our Special Correspondent.*)

Big Indian.—Sixty stamps are crushing over 300 tons per day at this property. Colin MacIntosh, of Helena, is superintendent.

Red Bird.—This property near Helena paid a dividend of 1c. a share for July.

Whitlach-Union.—Schwartz & Walber have a lease on the old tailings and dumps which are being run through the old National mill at Unionville.

MISSOULA COUNTY.

(*From Our Special Correspondent.*)

Montana-Kentucky Mining and Milling Company.—Fire has destroyed the concentrator and mine equipment of this company on the Vermillion. The loss is $150,000, with insurance amounting to $30,000. Louisville people formed the original company and spent in development and equipment $300,000 before they got into trouble and had everything attached. Eventually the property came into the hands of Spokane men, who owned it until quite recently.

PARK COUNTY.

Cokedale.—The pumps in these mines have been moved to the 600-ft. level, the water having been pumped out to this depth. The machinery that is being placed in the washer and at the hoisting plant is now nearly in position, and within a few weeks the manufacturing of coke will begin. The old ovens have been repaired, and new ones are being constructed.

SILVER BOW COUNTY.

Homestake Mining Company.—A mill is to be erected at the properties in Brown's gulch to treat the low grade ore.

(*From Our Special Correspondent.*)

Beal.—Perry H. Beal, for himself and the heirs of Dr. Geo. Bell, is about to sell to New York parties the property so long owned by the family near the head of German gulch. The details of the deal cannot be given as yet, but the price will amount to several hundred thousand dollars. The property comprises a gold bearing dyke of porphyry and phonolite, some 300 ft. wide, of proven value.

Colusa Parrot Mining and Smelting Company.—The extensive betterments planned are being installed. At the Butte Reduction Works, Senator Clark's idea of a new smelting plant elsewhere has evidently been abandoned. A large extension to the concentrator is under way. Sixteen of the new Wilfley tables have been ordered. Two blister copper furnaces having a capacity of 30,000 lbs. per day of blister copper, will soon be in operation. These will be followed by additional furnaces until the entire matte production of the works will receive further refining to about 98 per cent Cu in the new furnace addition. In some respects this is going back to the English method. Perhaps it can be called middle ground between the English and the convertor process. In these reverberatory furnaces the construction does not follow the old country plan, as a greater blast will be used. Of the two Nordberg hoisting engines ordered over a year ago by Mr. Wethey, general manager, one is now being placed at the Original; 11 cars to transport the machinery from Milwaukee to Butte were required. The second engine will be on the West Stewart shaft. The new steel gallows frames for both the Original and West Stewart mines are in position and are by far the highest head frames in Butte.

Homestake Mining Company.—This company, owning several claims on Brown's gulch, is considering the erection of a 20-stamp mill, with means to cyanide the tailings. One of the claims belonging to the company, the Sailor's Dream, has had a small stamp mill in operation for the last three years. This mill has demonstrated that amalgamation will save 60 per cent of the value.

Minnie Healey.—Two hundred miners are at work on this property for the Heinze interests. The case before the court is still *sub judice*. The Supreme Court practically remanded the case back to the lower court, and it probably remains for the Boston & Montana Company to apply for another injunction.

Northern Pacific Lease.—This tract of ground, situated within the triangle of tracks on the flat, and on which sinking for the past two years has been under way, is to be abandoned by the operators. The machinery has been removed and sold. Great difficulty was experienced on account of quicksand and water. Not far from this shaft, shaft No. 1 of the Farrell Copper Company was lost from the same causes. Bedrock is fully 700 ft. down. The old drainage course of Silver Bow creek is largely responsible for the trouble.

NEW MEXICO.

GRANT COUNTY.

International Gold Mining Company.—Machinery for a reduction plant for its Malone mine has been ordered by this company. W. H. Stevens is superintendent.

SAN MIGUEL COUNTY.

Tecolote Copper Company.—The mill began operations some days ago, making copper oxide.

NORTH CAROLINA.

DAVIDSON COUNTY.

Hercules Gold and Copper Company.—This company is finishing a melting plant of 50 tons daily capacity, purchased from the Allis-Chalmers Company, of Chicago, installing a large compressor and erecting a 10-stamp mill and concentrator.

GUILFORD COUNTY.

Fentress.—This gold mine, a few miles from Fentress, is operated on a large scale by New Jersey men.

McCulloch.—This old gold mine in Fentress township, idle for 50 years, is reported being developed by a syndicate of northern men.

TEXAS.

HARDIN COUNTY.

Sour Lake Oil Field.—A fire started on August 21 left not a derrick standing in the Shoestring district. In addition to the destruction of the derricks, many oil wells were destroyed and several hundred thousand barrels of oil that were stored in earthen reservoirs caught fire. The loss is estimated at $100,000. Very little could be done to control or stop the progress of the flames.

UTAH.

Ore and Bullion.—Salt Lake banks reported settlements for the week ending August 14 aggregating $362,900, as follows: Crude ores and concentrates, $194,900; base bullion, $159,000; gold bars, $9,000.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

Beaver Consolidated.—The shaft is down about 500 ft. and in ore. Crosscutting and drifting will be done at this depth and a larger pump installed.

Majestic.—Thirty feet of lead carbonates are reported opened up in the Gomer shaft of the Harrington & Hickory mine. The vein is flat and has not been put through.

Superintendent W. H. Kinnon, has advised Manager W. H. Alexander at Salt Lake that the smelter will be ready to blow-in about September 1. Only the lead furnaces will be started at present.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Ore Shipments.—A total of 158 carloads were shipped during the week ending August 14, as follows: Ajax, 2; Bullion-Beck, 6; Centennial-Eureka, 27; Carisa, 2; Eagle and Blue Bell, 3; Gemini, 12; Grand Central, 23; Mammoth, 19; May Day, 1; Star Consolidated, 3; South Swansea, 2; Uncle Sam Con., 4; Victor Con., 13; Black Jack, 11; Dragon Iron, 26; Noon's Iron, 4. For the week ending August 21 shipments aggregated 109 cars, as follows: Ajax, 1; Bullion-Beck, 4; Black Jack, 7; Centennial-Eureka, 8; Carisa, 2; Dragon Iron, 21; Eagle & Blue Bell, 1; Grand Central, 24; Gemini, 6; LaClede, 1; Mammoth, 13; Martha Washington, 1; Star Consolidated, 2; South Swansea, 2; Yankee Consoldated, 9; Victor Consolidated, 6; Uncle Sam Consolidated, 1.

Eagle & Blue Bell.—The Bingham Consolidated Mining Company has made the second payment of $10,000 on its option of 140,000 shares at the rate of $2 per share.

La Clede.—The pumps were recently drawn from the shaft. For some time the management has been prospecting with diamond drills from the bottom. On reaching the depth of 350 ft., the bit was lost. It is now the intention to begin on the surface and continue the prospecting with the drills.

Mammoth.—Arrangements for more favorable smelting charges have been made with the American Smelting and Refining Company, thus making it possible to ship ores which heretofore required concentration.

South Swansea.—The sinking pump has been withdrawn and hereafter operations will be confined to the upper levels. The expense of handling the water is too great and unless other companies join in some plan to unwater the district no further attempt will be made to explore below the 800-ft. level.

SALT LAKE COUNTY.

Great Divide Mines Company.—This company has been incorporated with a capital of $2,000,000. The property consists of 24 claims, embracing about 325 acres, adjoining the Bingham Copper Boy and part of the Utah Consolidated companies' west lines. The officers and directors are: Henry A. McCormick, president; Walter A. Cooke, vice-president; Joseph H. Hurd, secretary; Rodney T. Badger, treasurer, and John B. Taylor, superintendent.

(*From Our Special Correspondent.*)

Bingham Consolidated Smelter.—The copper bullion shipments for the week ending August 14 amounted to four cars, 240,000 lbs. During the week ending August 21 the copper bullion shipments amounted to 5 cars, 300,000 lbs.

Copper Prince.—Duncan McVichie of the Bingham Consolidated, and his associates have acquired an option in this Alta property. The deal involves nearly $500,000.

Utah Consolidated Smelter.—Copper bullion shipments during the week ending August 14 amounted to four carloads, 241,500 lbs. Copper shipments for the week ending August 21 amounted to 4 cars, 242,100 lbs.

United States Smelter.—Shipments of copper bullion during the week ending August 14 amounted to three cars, 181,500 lbs. Copper bullion shipments for the week ending August 21 were 3 cars, 181,000 lbs.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

California.—This property at Park City is to be sold at sheriff's sale on August 31 to recover on an indebtedness amounting to about $20,000.

Daly-Judge.—Thirty pound T rails are being laid in the 6,600-ft. main tunnel. The company will install mine locomotives. Heretofore mules have been employed. Orange J. Salisbury, of Salt Lake, is manager. The mill is temporarily closed.

Keith-Kearns Mill.—The building is practically completed and some of the machinery has arrived. The plant will go into commission about October 1.

Naildriver.—The directors have voted to sell sufficient treasury stock to raise $15,000 for development purposes. The shaft is to be continued to considerable depth.

Ontario Mill.—Excavations are about completed for the 125-ton plant to be erected near Park City.

PIUTE COUNTY.

(*From Our Special Correspondent.*)

Annie Laurie.—Miners are being put to work again. The property was recently shut down as a result of the attempt to unionize the camp. Improvements are being made in the mill.

Annie Laurie Extension.—Ore is reported in the tunnel. It is expected that the tunnel will tap the main ledge.

Wedge.—A sensational strike of gold ore is reported in a winze sunk from Tunnel No. 2 of this mine near Marysvale. The ledge is 9 ft. wide and the pay streak 5 ft. Samples of the ore brought the Salt Lake by George Romney, Jr., president of the Gold Vein Mining Company, which has bonded the property, carries high values.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Consolidated Mercur.—The management expects that it will be practically the first of September before the Moore slimes process will be in operation at the mill.

Sacramento.—The retorts ordered some time ago to replace those burned out have been installed. An average of 150 lbs. of quicksilver will be turned out by them daily, thus bringing the company revenue of approximately $100 per day.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

A settlement has been made of the taxes due Ferry county, from the Mountain Lion Gold Mining Company, for the years 1899, 1900, 1901 and 1902, with accumulated interest thereon on a basis of 40 per cent, amounting in all to $14,332. A basis of 40 per cent has been agreed on for the settlement of taxes due the county from the Apollo Consolidated Gold Mining Company for 1902, the assessed valuation being $40,585.

Belcher.—The No. 3 tunnel is in over 200 ft.

Eureka District Gold Mining Company.—This company has given a 3 years' lease of the Nob Hill and Little Cove mines to W. H. Kells, who has begun shipping from both mines. He has shipped four carloads from the Nob Hill, and two from the Little Cove. Formerly the Little Cove ore averaged $11 per ton, and the Nob Hill ore ran from $10 to $74 per ton. The Nob Hill had been idle two years, the Little Cove three years before the granting of the lease.

Gallatin Gold Mining Company.—The annual assessment work is being done on 2 groups of claims.

Golden Eagle Mining Company.—The shaft is down 76 ft. Timbers are being framed for the foundation for a steam hoist.

Little Chester.—This claim has been bonded to A. E. Patrick, who is organizing a company to resume work.

Mountain Lion Gold Mining Company.—A. E. Palmer, of Spokane, who now represents the control has gone to Portland, Ore., where a temporary directorate has been elected. Neil Cochran, of Rossland, B. C., is in charge of the mine, and has begun shipping ore from the dump to the Granby smelter. Mining will soon be resumed. W. H. C. Miner, president of the Granby Smelting Company, is reported largely interested in the mine. It is intended to ship from 100 to 200 tons per day, and any samples will be sent to the Hall mine's smelter, at Nelson, B. C. It is certain that the bulk of the ore will go to the Granby works.

Old Glory Group.—This and other property adjoining has been sold to Samuel Hill and Prince Henri De Croze, of Belgium. The property is about 24 miles south of Republic, on the south half of the Colville reservation.

Quilp.—The last week's shipments amounted to 14 carloads of ore to the Tacoma, and 2 to the Hall mines' smelter, a part came from above the adit level, but the most of it was broken in the winze below the No. 5 level.

WYOMING.

BIGHORN COUNTY.

United States Potash Company.—The potash deposits, two miles below Cody, are to be explored by this company, beginning early in September. W. M. Curtis is general field manager.

CARBON COUNTY.

Doane.—This copper property at Battle Lake is operated by the Battle Lake Tunnel Site Mining Company, Chicago. M. A. Cheney is president, H. G. Stegeman, secretary and manager, and R. G. Legg, of Salt Lake, Utah, is the engineer in charge.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—CARIBOO DISTRICT.

Consolidated Cariboo Hydraulic Mining Company.—The company's plant at Bullion has been shut down on account of failure of the water supply. One hundred men have been paid and no water will be turned on in any of the claims until May, 1904. Fifty-three days is the total time occupied in washing this season as against 66 days last year, when the water supply was shorter than it had been any year previous.

Wilcox.—A 10-stamp mill is to succeed the present 2-stamp affair. Phil White is superintendent.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Ore shipments for the week ending August 22 were: LeRoi, 5,550 tons; Centre Star, 1,620; War Eagle, 960; Kootenay, 330; Le Roi No. 2, 810; Giant, 30; Spitzee, 30; Jumbo, 150. Total, 9,480. Year to date 243,457. The feature of the week was the considerable increase in the LeRoi shipments. Spitzee re-enters the shipping list permanently, sending to Trail what ore was broken down in developments.

NOVA SCOTIA—CAPE BRETON.

The total shipments of coal from Nova Scotia collieries during the first six months of this year were 2,212,570 tons, an increase of 20 per cent over 1902. Of the tonnage the Dominion Coal Company is credited with 1,378,183 tons; the Cumberland Railway and Coal Company with 230,438 tons; the Nova Scotia Steel and Coal Company with 177,716 tons; the Arcadia Coal Company with 168,953 tons, and the Intercolonial Coal Company with 114,428 tons.

Londonderry Iron and Mining Company.—It is stated that operations will begin September 10. Furnace A will be ready at that date and will have a capacity of 150 tons of pig iron per day. The plant will include 3 hot blast stoves, 6 boilers, 2 blowing engines, 1 hoisting engine and 2 stone and ore crushers.

Nova Scotia Steel and Coal Company.—The blast furnaces which are being erected at Sydney are between Queen Colliery and Pig Pond. A number of men are engaged in excavating for the open-hearth furnaces which will be installed after the blast furnaces. Two batteries of Bernard coke ovens, 40 in each set, are now ready, and the pillars and abutments for the third battery are under way.

ONTARIO—RENFREW COUNTY.

Canada Corundum Company.—This company, which during 1902 produced about three-fourths of the world's supply of natural corundum, is erecting a new mill, at Craigmont, about one-half a mile from Craig mine mountain. The mining is done by open cuts. The grade of the corundum produced at the present mill is reported 95 to 98 per cent pure. The new mill is at the eastern end of the hill on York river, and will be connected by tramway with the quarry. The equipment will comprise a large ore bin, a coarse crusher, three fine crushers, four sets of rolls and screens, Overstrom concentrating tables, from which the product, consisting of corundum and magnetic oxide of iron, will pass to a dryer and then to the grading building containing magnetic separators, and splitters for separating the material into the various sizes required. There will be a complete power and lighting plant. It is expected that the new mill will be in operation early in September. G. F. Bartlett, superintendent of the company, designed the plant, being assisted by G. A. Overstrom.

MEXICO.

(*From Our Special Correspondent.*)

Fabulous tales of a new gold district near the Gulf of California, not far from La Paz, Lower California, are in circulation and numbers of miners are going there from Mexico and from Southern California towns. One shipment of $75,000 placer gold has arrived in Guaymas. It is a rough, dry country, at best, and mining in that region is under difficulties.

CHIHUAHUA.

(*From Our Special Correspondent.*)

The following mines are in bonanza: Iguana, San Juanico, Palmilla, at San Agustin; Tajo, at Parral; La Morena and La Preseña, at Minas Nuevas; Adela, at Buena Vista; Perros Bravos, at San Francisco del Oro; Saenes, at San Francisco del Oro; Vencedora, at Los Solises; La Platiada and La Maria, at Ronces Valles; La Novedad, Mina del Agua, Cabrestante, Tecolotes and Alfareña, at Santa Barbara.

There are a great many options and leases being taken on smaller Parral properties but no transfers of any importance have been made of late.

Dos Republicas.—This mine is handicapped on account of inadequate pumping facilities.

Palmilla.—This mine at Parral has encountered a body of high grade sulphide ore 1½ meters thick 450 ft. from surface. One car of it netted $16,000 Mex. (27-ton car.)

EL ORO.

Esperanza Mining Company.—Solomon and Daniel Guggenheim and William W. Porter have incorporated this company with a capitalization of $2,500,000 under New Jersey laws.

MINING STOCKS.

(Full quotations are given on pages 336 and 337.)

New York. Aug. 26.

Judging from the continued dullness in the market brokers are taking a longer vacation than is usually the case. Heretofore it was not considered an uncommon occurrence for brokers to be called back to the city to attend to business in the midst of their vacation. The contrary seems to be the case now, and it is intimated that speculation may not be active again for several weeks. The trading that is being done is spasmodic, and fluctuations in prices are generally only fractional, notably for the leading securities. The copper shares show comparatively little business, notwithstanding the efforts of the daily press to create interest by publishing bullish rumors. Amalgamated cut its transactions at times fully 50 per cent., and on Tuesday Anaconda was invisible. Sales of Amalgamated are noted at $46⅛@$48¾, and of Anaconda at $18@$18.78. On curb Greene Consolidated, of Mexico, was weak, selling at $19¼@$18¾. United, of Montana, attracted some attention by reason of the report that the production of copper at its mines is increasing; sales of the common stock were made at $15.75@$15⅞, and an auction sale of 100 preferred at $60 per share is noted. White Knob, of Idaho, showed a recovery to $12, but later lost 50c. British Columbia is seldom moved from the $3.25 pivot.

In the gold and silver list the weakness in the Cripple Creek section has caused comment, but this is explained by the labor troubles at the mines. Portland touched $1.18; Elkton, 37c., and Isabella, 12½c. Iron Silver, of Leadville, moved at $1.85. In the Comstock group business has been limited, owing to a new crop of assessments. Consolidated California & Virginia sold at $1.50; Ohpir, $1.55; Mexican, $1.10@$1.15; Caledonia, $1.10, and Union, 70@68c. Another sale of Silver Hill is reported at 70c.

Boston. Aug. 25.

(From Our Special Correspondent.)

After comparatively heavy dealings a week ago, a quiet spell set in, and prices settled somewhat, but the movement seems to be on again, with Copper Range in the lead. On two different days Copper Range has fluctuated almost nine points. From the high price of $69.25 a week ago to-day it broke to $50.75, but later rallied to $66.87½. The directors were in session to-day in this city, including John Stanton, of New York; Cameron Currie, of Detroit, and S. L. Smith, of Houghton, Mich., but nothing is vouchsafed from their deliberations. It is expected that a merger will be made with the Trimountain, and both will eventually go into the Amalgamated outfit. The declaration of a $10 dividend by the Calumet & Hecla had no effect on the stock, nor the market. Neither did the increase in the Wolverine dividend to $3. Trimountain has been heavy during the week, dropping $4.62½ to $80. Centennial dropped $4.50 to $17, but recovered to $21, and Mohawk $6 to $41, recovering to $43.75. Osceola dropped $7.50 to $54, then recovered to $61. There is strong talk of dividend prospects for the latter late this year. Quincy is off $10 to $90, and Tamarack $9 to $106. Calumet sold at $444 and $450.

Parrot fell $4.25 to $18.50, but easily recovered to $22. Utah slid off $2.25, but rallied to $27.50, and United States $2 to $19, recovering to $20. Winona broke $1.50 to $8, subsequently selling at $9.50, and Wolverine fell $4.50 to $68, later moving at $70. The copper from the Winona's new shaft is said to be paying the cost of sinking. Trinity shows renewed life. After settling $1 to $5.50, it touched $6.75 today. Shannon fell $1.50, but recovered to $12. Reports are that a body of sulphide ore has been struck in one of the mines of this company. Daly-West has declined $1 to $40. Seventy cents is bid for the next Daly-West dividend. Bingham settled $1.75 to $24.50, but regained the loss. Dominion Coal broke $6 to $78, recovering $2. Dominion Iron & Steel is almost stagnant, selling at $9.50. Affairs of these two companies are much mixed, the latest being the resignation of President Ross.

Colorado Springs. Aug. 21.

(From Our Special Correspondent.)

The second week of the Cripple Creek sympathetic strike terminated to-day, with the El Paso mine running full force, while the big drainage tunnel is being rushed to completion. President Moyer of the Western Federation of Miners admitted to-day that the tunnel would be finished in spite of the arbitrary stoppage of work a week ago, and those in charge announce that this important project will be finished in from 6 to 9 days. The resumption of the C. K. & N., the Golden Cycle and other mines is promised for next week. So far there has been no violence.

The mining stock market under these conditions could not be expected to amount to much. Trading has dropped off almost entirely, although prices, strangely as it may appear, rule at almost the same range as before the strike. El Paso has sold quite freely from 53@55c., Elkton at 39@40c., C. K. & N. at 18c., Isabella at 10@10½c., Moon Anchor at 9c., Portland at $1.21, and the prospect and miscellaneous stocks proportionately.

Salt Lake City. Aug. 22.

(From Our Special Correspondent.)

The heavy sales of Carisa towards the close of the week brought the total up to about $25,000 more than a week ago. Nevertheless the market has been dull and prices low. The striking of a body of good ore in the Carisa created a lively demand for the stock, advancing the price from 8c. to 14c., 60,000 shares being transferred. Consolidated Mercur held firm until the close, when it showed signs of weakness. Daly-West stiffened to $41, closing slightly weaker. May Day remained steady. A sale of Ontario was recorded at $5.25. A 50-share lot of United States brought $20 per share. The directors of the Swansea met and levied an assessment of 15c. a share, or $15,000. A forced sale of Star Consolidated caused a drop in price. The sales for the week totaled 153,287 shares, which brought $73,665.

San Francisco. Aug. 22.

(From Our Special Correspondent.)

Brokers have been taking a holiday, as there are so few investors visible and the Grand Army festivities are on that the stock market looks dreary. Practically the only business being done is in the Comstock specialities which give fractional profits.

Some quotations noted are Consolidated California & Virginia, $1.25; Ophir, $1.65; Confidence, $1.05; Best & Belcher, $1.75, and Caledonia, 99c.

More attention has been shown on the oil exchange, where sales of Home are reported around $1.50; Sovereign, 38c.; Occidental, 18c., and Independence, 17c.

Quiet reigned on the San Francisco & Tonopah Mining Exchange, Sales were Tonopah Midway at 47@48c., Tonopah North Star, 50c.; Montana-Tonopah, $1.10@$1.12½, and Tonopah & California, 35@36c.

COAL TRADE REVIEW.

New York, Aug. 26.

ANTHRACITE.

The anthracite coal trade, while much quieter than it has been, still shows a remarkably good demand, in view of the large tonnage now in the hands of actual consumers. Labor troubles in various industries still affect the demand for the steam sizes, and these sizes are being stored by the railroad companies. The slack market for bituminous coal and the fact that this is normally the poorest season of the year for steam sizes affect the situation.

In the Northwest there is still a good demand from country yards, though this has fallen off lately. Receipts at the head of the lakes have been liberal, but the car shortage has prevented the movement from the docks being what it might. In Chicago territory demand now is about normal for late Summer. Many consumers and dealers have put in all the coal they can store. The size most in demand seems to be chestnut. Along the lower lakes and in Canadian territory buying has improved slightly of late. Receipts of anthracite at lake shipping ports have been very heavy. In the line trade farther east demand generally is still quiet. Along the Atlantic seaboard conditions are as they have been for several weeks. The movement to all points is fair, and the demand from points beyond Cape Cod is strong enough to take all the coal that can be shipped thither for some weeks. The coastwise movement of coal has improved slightly, with the slackness in bituminous shipments and the lower vessel rates, consumers apparently wishing to take advantage of this month's discount. No improvement in demand is looked for before the coming of cold weather, but the companies have many storage yards still bare, and a heavy tonnage will go to these, so that, while demand may be light, it is not likely that there will be any weakness in prices of prepared sizes.

BITUMINOUS.

The seaboard bituminous trade continues generally quiet. Car supply has improved recently, and now, with the slack demand for coal, there are practically cars enough for all producers. Consumers still delay putting in supplies for next Winter, and as a rule have coal enough for immediate needs, therefore, new orders are very limited. Coastwise freight rates are weak, and the prospects are that the limited demand for coal, and consequently for tonnage, will send rates still lower.

Trade in the far East is quiet, as most consumers apparently have fair stocks on hand. Orders from the shoal water ports are pretty well cared for, most consumers having fair supplies in hand for this season of the year. Along Long Island Sound the outlook is better than it has been, principally because of some protracted labor disputes coming to an end. At New York harbor points trade is quiet. Coal for regular contracts is coming forward fairly well, but business outside of contracts is dull. Current quotations for Clearfield are $2.60@$3, according to grade, f. o. b. New York harbor shipping port. In the all-rail trade conditions are little changed. The volume of business is about what it has been, and coal is still offered at low-mine prices.

Transportation from the mines to tidewater is good, coal coming through in four or five days. Car supply at the mines is now about as liberal as can be expected, being fully 75 per cent of the demand. In the coastwise vessel market, vessels are in fair supply, while the demand for tonnage is not heavy. Rates have a downward tendency and for large craft are possibly 5c. lower than current quotations, which are from Philadelphia; Boston, Salem and Portland, 90c.; Portsmouth and Bath, 95c.; Lynn and Bangor, $1.10; Newberryport, $1.15; Saco, $1.20 and towages; Gardiner, $1.05 and towages; Providence, New Bedford and Long Island Sound, 75c. From New York harbor rates are 70@75c. to Boston, Salem and Portland, and 60@65c. to Sound points.

Birmingham. Aug. 14.

(From Our Special Correspondent.)

The coal output is improving and there is a steady demand for every ton produced. The Pratt Coal Company, which is opening new mines in the western part of Jefferson Count, is equipping its properties with the latest improved mining machinery and expects to have a daily output of several thousand tons of coal. The Bessemer Land and Improvement Company, the Little Cahaba Coal Company, and other coal concerns in Bibb County, have made application to the Southern Railway for a 12-mile extension from that road to permit further development of mining lands. The Southern Railway will probably build the line. It is announced that the Tennessee Coal, Iron and Railroad Company expects to introduce soon coal cutting machines at one of its Pratt mines. Such machines are now used at Corona and Carbon Hill, in Walker County, and at Mary Lee, in Jefferson County.

The production of coke is heavy, all ovens which were cold during the coal miners' strike now being again in full operation.

There are fears of another car shortage in this district next winter and therefore much coal will be stored. The larger consumers have been placing orders recently and delivery is urged right along.

Chicago. Aug. 24.

(From Our Special Correspondent.)

The anthracite trade continues steady, if not of larger volume than is usual in midsummer. The large accumulations in bins and on docks causes confidence among retailers and consumers, but the transportation problem makes some wholesalers prophesy a shortage. It now seems evident that there will be a congestion of traffic and a falling off in the all-rail supply of coal, both anthracite and bituminous, when cold weather sets in, and there are signs that the transportation problem may be a serious one for Chicago and adjacent territory by the end of September. As soon as any trouble with the coal distribution or supply from this source becomes manifest, it will doubtless be increased through the efforts of buyers to get all they can before the situation becomes worse. This is looking ahead, however, farther than most people who are interested in the coal trade are accustomed to look. If there is any remnant of the former activity it is in the demand for egg; stove and chestnut sales are almost dull.

The bituminous end of the coal business is also quiet—again the normal condition for the season. Hocking, which advanced from $3.65 to $3.90 on August 15, is not selling quite as well, and predictions are made that the price will be shaded soon, though the circular quotation at present seems to be adhered to. Smokeless has been so plentiful that the circular prices of $3.90 for run-of-mine and $4.35 for lump and egg are only nominal; sales have been made probably at 50c. under these figures. The accumulation of smokeless is checked, however, by the efforts of dealers and the sales at low prices, and this week will probably show a condition more nearly normal. Indiana block remains at about $3.20; Indiana and Illinois lump at $2.25@$2.75, and screenings at $1@

$1.40. Sales of Indiana and Illinois have been perhaps better, on the whole, than last week.

Cleveland. Aug. 25.

(From Our Special Correspondent.)

The resumption of some manufacturing concerns which have been idle for the midsummer repairs has caused a little better demand for steam coal, and the market has stiffened slightly. Demand will have to be much better before the situation becomes really strong. Prices have held steady, but are weak. The demand for domestic coal is very much improved, and buying of anthracite has been heavier than common. The market has an upward trend, with some of the dealers trying to force a change locally.

In the lake trade the market has been steady, and the movement rather heavy. The supply of cars, after long urging, has been improved. This, aided by the better supply of boats and the quicker handling of the cars at the lower lake ports, has relieved the situation materially. There is still a congestion at the head of the lakes, and boats there are suffering considerable delay. The shippers away from the upper lake ports have been trying to move the material, but have been hindered by the northwestern car situation, which is none too encouraging. The rates of carriage have held firm at 50c. to Lake Michigan and 40c. to Lake Superior. No further sales have been reported of any importance, although it is expected that more contracts will be closed. The demand in the Northwest is heavy. The prices hold at $2.45 for Pittsburg and West Virginia lump and $2.35 for Ohio lump.

Pittsburg. Aug. 25.

(From Our Special Correspondent.)

Coal.—The car supply has been a trifle better, but is not equal to requirements. The Pittsburg Coal Company is ahead in its shipments to the Northwest compared with this time a year ago. An officer of the company admitted to-day that it would be impossible to fill all contracts, and the shortage may reach 1,000,000 tons, about the same as last year. The tonnage shipped will be greater, as more business was taken. The local demand is equal to the supply, and prices are firm.

Connellsville Coke.—The production has not fallen off as heavily as had been anticipated, and the shipments last week were nearly as great as the week before. For strictly standard Connellsville coke the price for furnace remains at $3 and for foundry at $3.25@$3.50. It is said that these rates have been shaded in some instances, but from present indications these prices are likely to continue throughout the year. The *Courier* in its last report gives the production in the Connellsville region the previous week at 245,680 tons, and the shipment at 10,321 cars, distributed as follows: To Pittsburg and river tipples, 3,562 cars; to points west of Pittsburg, 4,221 cars; to points east of Connellsville, 2,538 cars. This shows a decrease of 23 cars. In the lower Connellsville region the production last week was 51,795 tons.

San Francisco. Aug. 19.

(From Our Special Correspondent.)

There is no especial change in the coal market which continues quiet. We quote these yard prices for Pacific coast coals: Roslyn, $7; Wellington, $8; Seattle, $6.50; New Wellington, $8; Coos Bay, $5.50; Bryant, $6.50; White Ash, $5.25; Richmond, $7.50.

Cargo lots of Eastern and foreign coals are quoted per ton as follows: Wallsend, $7.50; Brymbo, 7.50; Pennsylvania anthracite, $14; Cumberland, $13; Cannel, $8.50; Welsh anthracite, $13; Castle Gate, $8.50; Clear Creek, $8.50; Rock Springs, $8.50; Colorado anthracite, $14; Sunnyside, $8.50.

Foreign Coal Trade. Aug. 26.

There is little change since last week in reports from foreign markets. Business is improving, but as yet there is little inducement for exports of American coals to Europe. Prices on this side must fall before foreign business is sought.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of August 14 that the Welsh coal market remains very firm all round and steam coals are difficult to arrange for August. Tonnage is plentiful. Quotations are: Best Welsh steam coal, $3.96; seconds, $3.84; thirds, $3.60; dry coals, $3.36; best Monmouthshire semi-bituminous, $3.36@3.48; seconds, $3.30; best small steam coal, $2.22; seconds, $2.10; other sorts, $1.92.

The above prices for Welsh coal are f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market is quiet and unchanged, with quotations as follows: Marseilles, $1.20; Genoa, $1.14; Naples, $1.14; Colombo, $2.40; Las Palmas, $1.38; St. Vincent, $1.50; Rio Janiero, $2.28; Santos, $2.52; Buenos Ayres, $1.92.

IRON TRADE REVIEW.

New York, Aug. 26.

The outlook in the iron and steel industry is apparently a little more favorable than last week. It can scarcely be said that market conditions have materially improved, but the outlook is better simply because prices in most lines have remained steady with no indications of a decline and there have been some good-sized purchases of finished material in the middle west. The cut in quotations by the Southern Association furnaces to $12 for No. 2 foundry, though it did not affect most markets since $12 was already a ruling price, was followed by reductions on Northern irons, furnaces in the valleys cutting quotations to $16@$16.50 for No. 2 foundry and this cut led to some buying. Many blast furnaces in the Pittsburg district and in the valleys are still out for repairs, but the present outlook is that prices for pig iron will remain steady if they do not advance.

Steel mills in the central west are generally well filled with orders and prices are maintained. The harvester trust has placed a contract for 40,000 tons of steel bars at the official price. The American Steel Hoop Company has reaffirmed the quotation of 1.90c., base, on hoops. The market for tin plate continues strong. The weak points in finished material at present are in the west, sheets and structural material, in the east, plates and merchant bars. The iron ore market is quiet, and the demand for old material is very light.

Birmingham. Aug. 26.

(From Our Special Correspondent.)

The reduction of $1.50 per ton on pig iron last week helped the market considerably and quite a number of sales are reported, the orders being for larger lots than for several weeks. The reduction was made by the Association furnaces after a thorough discussion. Non-Association furnaces had been selling for two weeks or more at prices under those asked for the product by the Association. It is not believed that any iron is to be procured in this section under the $12 rate, either from Association or non-Association furnaces. Robert Fields, sales agent for the Sloss-Sheffield Steel and Iron Company at Cincinnati, reports that prospects are bright. Railroad officials report some improvement already in the iron market conditions. The Alabama Consolidated Coal and Iron Company has blown in its new Gadsden furnace, which has a larger bosh diameter than any in the State and should have a daily capacity of between 250 and 300 tons of iron. The furnace is equipped with a skip hoist and other improvements. The Republic Iron and Steel Company blew in its No. 2 furnace at Thomas and has blown out No. 1 furnace. The new furnace of the Central Coal and Iron Company at Holten, in Tuskaloosa County, continues to do well. Furnace No. 4, of the Woodstock Iron Company, at Anniston, is making from 200 to 205 tons of iron daily. The Sloss-Sheffield Steel and Iron Company has blown in the furnace which was banked and now has six out of its seven furnaces in operation. It is announced that Furnace No. 2, of the Tennessee Coal, Iron and Railroad Company is ready after undergoing repairs which cost something like $30,000. Four of the five furnaces at Bessemer are in blast.

The following iron quotations are given: No. 1, foundry, $12.50; No. 2, $12; No. 3, $11.50; No. 4, $11; gray forge, $10.50@11; No. 1, soft, $12.50; No. 2, $12. There is no change in finished iron and steel.

Chicago. Aug. 24.

(From Our Special Correspondent.)

The business of the week ending to-day seems to show a fairly satisfactory increase of sales, though prices are at the bottom. Prospects are more encouraging than for several weeks. Inquiries and the general tone of customers indicate that there will be something doing approaching briskness by September 1. The action of the Southern Association in confirming prices that had been established by the market had no appreciable effect on sales, which have generally been made at or near the $12 Birmingham mark. for Southern, or $16.35, Chicago. Northern iron is selling at 50c.@$1 more, on quick delivery orders, but there is a tendency by some buyers to lengthen out the time between the order and the delivery; one of the encouraging signs of the situation.

The coke market is demoralized; there is any quantity of coke to be had at a low price—$5 and perhaps 50c. less on some sales of the week. Coke has been pouring into Chicago in such quantities that it has been necessary to get rid of it somehow or anyhow. As usually happens at such times, the check due to restrictoin and diversion of shipments is operating slowly, and will apparently do some good by the end of another week.

Cleveland. Aug. 25.

(From Our Special Correspondent.)

Iron Ore.—No sales of ore have been made and the wild shipment of that material down the lakes is being curtailed. The movement through Marquette and Escanaba is slack, although still brisk from the head of the lakes. Rates of carriage are unchanged at 80c. from Duluth; 72½c. from Marquette, and 60c. from Escanaba. Ore prices are unchanged at the old figures, $4.50 for bessemer old range; and $4 for bessemer Mesabi as a basis.

Pig Iron.—Northern furnaces have reduced the price of No. 2 foundry to $16 to $16.50, valley furnace, to meet the recent cut by Birmingham furnaces. This general reduction of prices, brought out good buying generally. In this territory known sales have aggregated more than 5,000 tons, most of it for spot shipment. Most furnaces place no limit on the length of contracts to be made under present prices, but a number of stacks have refused to sell iron for a longer period than October 31, and their action has given a much stronger tone to the general market. Some furnaces which had been out of blast for repairs have resumed operations. The supply of coke is all that could be desired for immediate purposes, but there are still apprehensions of a shortage through a lack of cars. The bessemer market is quiet. Reports are abroad of sales pending to the Steel Corporation, but nothing has been done. The price holds at about $18 in the valley. Basic is temporarily off the market.

Finished Material.—The sheet situation is not so strong as it was, although still fair. Smaller mills are cutting in occasionally on the larger concerns, getting contracts at reduced prices. General quotations, however, have not changed in the least, being based on 3.05c. for No. 27 out of stock and 2.20c. for No. 14 in car lots at the mill. The plate trade is a little better. The smaller mills are hard put for business and have been compelled to get business, at times, by cuts in prices. These have not been general. The quotation prevailing is 1.60c., Pittsburg. Structural trade is rather easy, with all mills looking more or less for business. The tone is a little better, due to the fact that some of the concerns which have unfinished contracts, the completion of which was delayed by the labor difficulties, are looking about for material. Order booking is light, but specification against contracts is improved. The general price is 1.60c., Pittsburg, with jobbers asking 2.15c., their business being limited. Buying of bar iron has been heavier at reduced prices. In instances the quotation has gone below 1.50c., Youngstown, but in some places the price has been held above that figure. The general quotation now is about 1.55c. at the mill. Bar steel buying is reported heavy, regardless of the inroads of the iron trade. Prices hold at 1.60., Pittsburg for bessemer and 1.70c., Pittsburg, for open hearth. The billet trade has also improved slightly and prices have held firm at $27.50, Cleveland.

Old Material.—There has been but very little business done and the dealers complain that the trade is uncommonly light. It is seemingly difficult to do business at any price whatever. An accurate quotation of the market is impossible.

New York. Aug. 26.

Pig Iron.—The lower quotations named by furnaces affected prices but little. Buying is still largely of a hand-to-mouth order. For Northern irons at tidewater we quote: No. IX foundry, $17.25@$17.50; No. 2X, $16.50@$17, while No. 2 plain can be had for 50c. less; gray forge, $15.50@$16. For Southern iron, on dock, quotations are: No. 1 foundry, $17; No. 2, $16.25; No. 3, $15.75.

Plates.—Labor troubles still make buying light, but business has improved of late. Sheared plates are quoted as follows: Tank, ¼-in. and heavier, 1.78@1.85c.; flange, 1.90@2c.; marine, 2.05@2.10c.

Bar Iron and Steel.—Prices for large lots on dock are: Refined bars, 1.70@1.90c.; soft steel bars, 1.75@1.80c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight. Relaying rails are $28@$33 for heavy sections and $33@$38 for light sections.

Structural Material.—Demand locally has not improved. For large lots at tidewater, nominal quotations continue 1.75@2c. for beams angles, channels and tees.

Philadelphia. Aug. 26.

(From Our Special Correspondent.)

Pig Iron.—Stocks of pig iron in the East, especially in foundry grades, are in favor of buyers. The volume of business shows that the buyers are not anxious to take advantage of present quotations. Buying continues in all grades, but brokers report caution and some apprehension of a further break in prices. It is evidently not the intention of consumers to stock up until the corner has been turned. The largest consumers do not believe there is any occasion for anticipating requirements. Foundrymen and stove makers are picking up considerable iron, but are not by any means loading up. Makers are showing figures that the market must strengthen from this out. No. 2 iron has been bought with a fair degree of liberality at about $17@$17.25; No. 1 X foundry is quoted at $18@$18.50; No. 2 plain, $16.25 @$16.50; standard mill irons are quoted as high as $16.50 and as low as $15.75; basic iron is quoted at $16. Negotiations are pending to-day for considerable basic.

Steel Billets.—There is some doubt among buyers as to whether steel billets will hold to present quotations; $28.50 is quoted for basic at local mills. The consumption of billets is very heavy. Considerable new work recently taken means that mill people will soon be obliged to cover.

Merchant Bars.—Reports from a number of mills show that more orders could be taken care of. Extremely low figures have been named on some new business. Refined bars are quoted at 1.50@1.70c. in large lots and steel bar 1.70@1.80c.

Sheets.—The sheet iron mills are doing a good business. Customers are complaining of slow deliveries and storekeepers report an active demand in the retail lots for spot delivery.

Merchant Steel.—An improvement has set in within a day or two, owing to the placing of three or four large orders for New England delivery.

Pipes and Tubes.—favorable conditions continue, and prices are maintained by all makers. Deliveries are slow and shop work is urgent.

Skelp.—Some new skelp orders are coming, but mill capacity is not fully taken.

Plates.—Business for the week has been made up of small orders, largely for local requirements. The mills for the most part are reported running steadily. Inquiries for Winter deliveries are reported from some of the large plate buying interests, but at shaded prices. Plate iron makers say there is no fluctuation in prices and that quotations are maintained.

Structural Material.—No large orders have been placed for several days. The rumor that the American Bridge Company is about placing very heavy orders for Winter bridge building work seems to have no better foundation than that when prices suit the company will be a large buyer.

Steel Rails.—Business has been of restricted proportions. Light sections are in moderate request. Girder rails are just now inquired for more than other kinds.

Old Rails are dull and weak.

Scrap.—All scrap has weakened and very little business is reported.

Pittsburg. Aug. 25.

(From Our Special Correspondent.)

Sales of pig iron during the week were only in small lots and the prices indicate a decline from the quotations of a week ago of 50@75c. a ton on the different grades. Bessemer pig is quoted at $17, valley furnace, but no sales have been made and it is believed that on a good order for early delivery a higher price would have to be paid. The announced cut to $12, Birmingham, on Southern foundry No. 2, equivalent to $15.85, Pittsburg, did not affect the market here, as sales at that figure had already been made. A small tonnage of Northern foundry sold at $16.75, Pittsburg. Other sales were made at a slightly higher price. But little business has been done in gray forge and the price is lower than in over a year. Many of the blast furnaces in the valleys are out for relining; there is not a great deal of iron available and most of that is held by a single interest which is not disposed to sell at the low prices offered. The low prices of pig are not expected to continue and in some quarters the prediction is made that rates for the fourth quarter will be higher.

The steel market has been the dullest of the year, but the mills are well filled with orders. Prices in all finished lines are firmly maintained. At a meeting of steel bar manufacturers the price of 1.60c. in force for over a year, was reaffirmed. Buyers who have been waiting for concessions will now likely come into the market. The International Harvester Company which is expected to buy at least 75,000 tons, has just placed a contract for 40,000 tons at the official price. The price of steel hoops has been reaffirmed at 1.90c., base, with the usual differential of $2 a ton for lots under 250 tons. The American Steel Hoop Company, a subsidiary concern of the United States Steel Corporation, led in the establishment of a price that will be strictly maintained the rest of the year. This action is expected to bring orders from waiting buyers, and while the hoop trade has been good for the summer months, an improvement is expected. The maintenance of prices in finished steel is having a favorable effect in the market and there is more confidence than in former years when in dull seasons price-cutting was resorted to. The only price weakness in finished products is in sheets and in structural material for new business. The largest sale of sheets for many months was a lot of 11,000 tons sold by the American Sheet Steel Company to the International Harvester Company. The tin plate trade is in excellent shape. All of the mills of the American Tin Plate Company have been in steady operation for months and the repairs were absolutely necessary. There are orders on the books that will keep every plant running full for two months or more. Independent concerns have booked a number of important orders for early shipment that had been turned down by the leading interest. While the official price is $3.80 a box, it is reported that premiums are paid for prompt shipment. The Amalgamated Association of Iron, Steel and Tin Workers continues to maintain a strike at the Port Vue plant of the McKeesport Tin Plate Company. The only indication, however, that a strike is still on are the frequent disturbances, non-union men being attacked going to and from the works. The company is paying the rate of wages provided for in the Amalgamated Association scale, but refuses to comply with the working conditions, particularly in the limit of output. In the past few days each mill has averaged 6,200 lbs. a turn, which is in excess of the Amalgamated limit. As a result, the men's earnings are greater than those of men employed in union mills. A strong effort was made to close the tin house, but the members of the Tin Workers' International Protective Association positively refused to go out on a sympathy strike as the scale of this organization has been signed by the company. It is strongly hinted here that trouble is likely to occur among the structural iron workers, and that this is responsible for the hesitation in placing new business. The announcement that President Frank Buchanan had formed an alliance with the New York faction controlled by Walking Delegate Samuel J. Parks caused considerable indignation among the members of the organization in the Pittsburg district. When Parks recently declared that he would order a strike in a number of cities including Pittsburg, the local union here promptly held a meeting and decided to disregard any such order. The local union has a contract as to wages with the American Bridge Company that does not expire until January 1, 1905, but changes in working rules may be made, if desired by either side, on January 1, 1904.

Pig Iron.—No sales of bessemer pig were made during the week and while the lowest quotation is $17, valley furnace, it is not believed that a good order for early delivery could be placed at that figure. Gray forge is quoted at $15.75@$16, Pittsburg, but little business was done. Some Southern foundry No. 2 sold here at $16.85 and a small tonnage of Northern at $16.75@$17.50.

Steel.—A large tonnage of bessemer steel billets sold during the past few days at the agreed price of $27. Some of the contracts closed cover deliveries through the rest of the year. The price is firmly maintained. Steel bars and plates continue firm at 1.60c.

Sheets.—The sheet market is in fairly good shape, but prices continue weak. Independent mills are reported to be shading the official price of 2.75c. for black sheets No. 28 gauge and of 3.85c. for galvanized.

Ferro Manganese.—Some domestic 80 per cent sold this week at $49@$51 and the foreign product is held at about the same figures.

Cartagena, Spain. Aug. 8.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments for the week were 2,030 tons manganiferous, and 3,300 tons dry ore. There is nothing of importance to note as few cargoes for prompt delivery are reported sold. Business continues dull and stocks are accumulating.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@ 7s. 6d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

CHEMICALS AND MINERALS.

(See also Prices-Current, Page 338.)

New York, Aug. 26.

Buying is of a hand-to-mouth character, while prices show little change, excepting that nitrate of soda has advanced further.

As intimated in this column recently the Virginia-Carolina Chemical Company has decided to discontinue dividend payments on the common stock so as to provide more capital for its cash reserve fund. This policy is considered advisable, as the company has long time credits on its books. Financial assistance will also be given by New York bankers whose representatives have been added to the finance committee of the company. This is another indication that it is necessary to carry a substantial reserve fund outside of the capitalization in order to meet the expenses of an expanding business, especially if it is the policy to control an independent supply of raw materials.

Simultaneously there appears the annual report of the American Agricultural Chemical Company, the northern fetrilizer combination. This shows that the profit abailable for dividends amounts to $1,370,005. During the year the company purchased the remaining 47 shares of the capital stock of the Peace River Phosphate Company, of Florida, thus securing complete control of an independent supply of one of the most important raw materials used in its manufactures. The Peace River property is valued in the assets at $1,051,621. The Bowker Fertilizer Company's works have also been acquired.

A semi-annual dividend of 3½ per cent, payable September 2, has been declared by the Merrimac Chemical Company, of Boston, Mass.

The powder combination is gradually getting into shape, and already an agreement has been made, it is reported, between the California Vigorit Powder Company, and the E. I. du Pont de Nemours Powder Company. The terms are based on an output of the California Company's plant of at least 300,090 lbs. of 40 per cent nitroglycerine dynamite per month at a profit of 1c. per lb. The net earnings of the California concern are estimated at $36,000 per annum, from which a dividend at the rate of 5 per cent has been paid on the $200,000 preferred stock. Briefly the California Vigorit stockholders will receive $4 per share in preferred stock, and $4.16 in common of the E. I. du Pont de Nemours Company's capitalization.

Cyanide of Potassium.—Imports are moderate, owing to a limited demand. The prices remain at 20c. per lb., f. o. b. New York.

Bleaching Powder.—In the absence of new bookings for next year's delivery, owing to the unwillingness of sellers to commit themselves until the prospects of the market have been analyzed, prices remain as last week, $1.05@$1.10 per 100 lbs. for high test foreign bleach, f. o. b. New York, and 87½c.@$1 for domestic, f. o. b. works.

Copper Sulphate.—Orders are few, but makers of copper sulphate have strengthened their views, and are now asking on the basis of $4.70 per 100 lbs. Great Britain continues to gain the export trade, reporting shipments in July of 2,272 long tons. This makes 47,984 tons exported in the seven months, which compares with 38,264 tons in the corresponding period last year. The average f. o. b. value of this year's exports was $92.96 per ton, as against $94.88 in 1902. The decrease in value this year is more than made up by the increased exports.

Acids.—This is seasonable weather for sulphuric and other acids that are used by soda water manufacturers. Otherwise trade is quiet, and prices, excepting for oxalic, are steady.

We quote as below, per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, Com'l	$5.00@$5.37½
Muriatic, 20°	1.00	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.37½	Sulphuric, 60°, bulk, ton	18.00@20.00
Nitric, 38°	4.75	Sulphuric, 66°	1.20
Nitric, 40°	5.00	bulk, ton	21.00@23.00
Nitric, 42°	5.37½		

Brimstone.—The only spot supplies are small lots held in store for which $22.75@$23 per ton has

been asked for best unmixed seconds. For shipments importers quote $22@$22.25 for best unmixed seconds, while thirds are nominally $1 less. In July the imports of brimstone into Great Britain amounted to 2,928 long tons, making 13,040 tons since January, as against 14,250 tons in the corresponding period last year.

Pyrites.—There has been a slight relaxation in demand, but prices continue unchanged. In July Great Britain reported imports of 58,959 tons pyrites, making 459,846 tons for the seven months, as against 374,402 tons in 1902. The approximate sulphur content of this year's imports was 216,128 tons.

We quote: Domestic pyrites, $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 11@12c. per unit for lump and 10@10½c. for fines delivered at Atlantic ports.

Nitrate of Soda.—The market is higher and advancing, owing to the scarcity of nitrate of soda on the coast and the high prices ruling there. Sales are reported from the coast at 7s. per qtl., which is the highest quoted in a long time. In New York spot sold at $2.25 per 100 lbs., September to October arrivals, $2.10, and November forward, $2.05. Consumption both here and in Europe is on the increase, and this coupled with the labor troubles and bubonic plague in Chile, causes importers to look for continued strength in the market.

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write under date of June 27 that the transactions during the fortnight sum up to over 1,000,000 qtls. Sales of 95 per cent have been effected at 6s. 6d.@6s. 6½d. for July, 6s. 7d. @6s. 7¼d. August-December, and of 96 per cent at 6s. 9d.@6s. 9½d. for July: 6s. 9d. July-December, 6s. 8½d. November-December, 6s. 8½d. January-April, 1904, all alongside terms. The production during the first five months of this year was 12,314,000 qtls., against 11,170,000 qtls. in the same period of 1902. We quote 95 per cent, 6s. 6d. July, 6s. 6½d. August-November, 6s. 6d. December, 6s. 5d. January-March, and 96 per cent, 6s. 8½d. July-October, 6s. 8d. November-December, all ordinary terms, sellers. The price of 6s. 6d. with an all round freight of 20s. stands in 8s. 3d. per cwt, net cost and freight, without purchasing commission.

Sulphate of Ammonia.—The wavering market abroad has eased prices in New York, and sellers now quote $3.02½@$3.05 per 100 lbs. for good gas liquor for shipment. It is said that the domestic output is sold up, for the present at least.

Phosphates.—Miners are in a unique position, having comparatively small stocks on hand, and enough orders to keep them busy for some time. Already vessel room for the first quarter of next year is being contracted for by exporters, and of the charters taken we note 12s. 6d. ($3) from Tampa to Dublin, Ireland, and 15s. 6d. ($3.72) to Stettin, Germany.

Efforts are being made to increase the sale of Pacific and Ocean Island phosphates, and quotations are 8d. per unit for delivery at North Sea ports, and 8½d. for Baltic. These prices are high, owing to the purity of the phosphates.

The imports of phosphates into Great Britain in July amounted to 35,068 tons, making 218,455 tons since January, as against 203,461 tons in the corresponding seven months last year.

Phosphates.	Per ton. F. o. b.	United Kingdom or European ports. Unit.	Long ton.
*Fla. hard rock (77@80%).	$7.00@$7.50	6¾@7⅝d.	$10.53@11.90
*Fla. land peb. (68@73%).	3.50@ 3.75	5½@5¾d.	7.70@ 8.05
†Tenn. (78@82%) export.	4.00@ 4.25	6½@7d.	10.40@ 8.05
†Tenn. 78% domestic	3.75@ 4.00	.....	.....
†Tenn., 75% domestic	3.50	.....	.....
†Tenn., 73@74% domestic.	2.95@ 3.20	.....	.....
†Tenn., 70@72% domestic.	2.70@ 2.95	.....	.....
‡So. Car. land rock	...@ 3.25	.....	.....
‡So. Car. riv. r'k (55@66%)	2.75@ 3.00	4⅝@5½d.	5.55@ 6.60
Algerian (63@70%)	.....	5½@6¼d.	7.37@ 8.38
Algerian (58@63%)	.....	4⅝@5¾d.	5.55@ 6.90
Gafsa (Tunis)	.....	5¼@6d.	6.30@ 7.20
Christmas Isl. (80@85%)	.....	7½@8¼d.	12.45@12.87

*Fernandina, Tampa, Brunswick, Savannah or Port Inglis.
†Mt. Pleasant. ‡On vessels, Ashley River.

Liverpool. Aug. 12.

(*Special Report of Joseph P. Brunner & Co.*)

In heavy chemicals shipments continue on a fairly large scale, as shown in the following exports for the month of July, as taken from the Board of trade returns:

Bleaching Materials.—To United States, 56,468 cwts.; other countries, 22,498 cwts.; total, 78,966 cwts. Soda ash, 98,226 cwts.; caustic soda, 119,261 cwts.; bicarbonate sodt, 26,192 cwts.; soda crystals, 12,724 cwts.; salt cake, 108,635 cwts.; other sorts, 29,416 cwts.; total, 394,454 cwts.

In bleaching materials there is a slight falling off in the shipments to the United States, as compared with the corresponding month last year; but the increase to other countries more than offsets this. In sodas the most noticeable feature is the large increase in the exports of salt cake.

Soda Ash for tierces is about as follows: Leblanc ash, 48 per cent, £5@£5 10s.; 58 per cent, £5 10s.@£6 per ton, net cash; ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces.

Soda Crystals are generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for a few favored markets. Prices are firm, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash.

Bleaching Powder continues dull as regards spot business and for hardwood prices are nominal at about £3 10s.@£4 per ton, net cash, as to market. For 1904 delivery, sellers are mostly holding off for the present and buyers are unable to place contracts now except at an advance over prices that would have been accepted a short time ago.

Chlorate of Potash is dull, at about 2¾@2⅞d. per lb. for English make.

Bicarbonate of Soda is without change at £6 15s. per ton, less 2½ per cent, for the finest quality in 1-cwt. kegs, with usual allowances for larger packages; also special terms for a few favored markets. Mineral water quality is scarce, makers being well sold for some time ahead.

Sulphate of Ammonia is quiet and easier, at about £12 7s. 6d.@£12 10s. per ton, less 2½ per cent for good gray, 24@25 per cent in double bags, f. o. b. here.

Nitrate of Soda is scarce for immediate delivery and quoted at £10 2s. 6d.@£10 5s. per ton for double bags, f. o. b. here, as to quality. For delivery out of cargo due next week 2s. 6d.@5s. reduction would be accepted on the figures named for immediate delivery.

METAL MARKET.

New York, Aug. 27

Gold and Silver Exports and Imports,

At all United States Ports in July and Year.

Metal	July. 1902.	July. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports	$7,884,339	$9,117,758	$28,160,576	$40,453,999
Imports	1,594,421	4,631,217	14,781,765	18,607,271
Excess	E. $6,289 918	E. $4.486,541	E.$13,378,811	E. 21,846,728
Silver:				
Exports	$3,671,814	$3,015,426	$26,199,848	$20,520,765
Imports	2,276,480	2,564,217	14,497.218	12,545,511
Excess	E. $1,395,334	E. $451,209	E.$11,702,630	$7,975,254

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending August 26, and for the years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week..	$11,050	$69,230	$430,102	$7,033	E. $353,779
1903....	32,173,799	3,704,830	13,357,375	1,667,937	E. 40,159,307
1902....	24,513,808	1,569,012	16,777,431	822,727	E. 38,899,500
1901....	25,739,808	2,042,122	21,429,176	2,569,047	E. 42,608,849

Exports were chiefly in silver to London and Paris; imports principally gold from Central and South America and the West Indies.

Preparations are being made for an increased fall trade, and business prospects are good. The speculative markets are still somewhat unsettled, it being almost impossible to advance quotations above a certain point without causing a subsequent reaction. It appears that the more important financiers are not yet ready to take hold of the stock market to any great extent, and until they do, speculation will not be permanently active.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending August 22, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	$887,837,400	$918,687,900	$917,944,900
Deposits	968,149,600	948,269,800	913,782,000
Circulation	29,007,600	32,414,900	43,968,000
Specie	182,926,600	171,562,200	174,179,200
Legal tenders	77,258,900	75,248,600	75,324,600
Total reserve	$260,185,500	$246,810,800	$249,503,800
Legal requirements	242,037,400	237,067,450	228,445,500
Balance surplus	$18,148,100	$9,743,350	$21,058,300

Changes for the week, this year, were increases of $9,599,300 in loans and discounts, $10,466,700 in deposits, $37,700 in circulation, and $3,548,300 in specie; decreases of $1,441,900 in legal tenders, and $505,275 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparisons made with the holdings at the corresponding date last year.

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd..	$171,562,200	.....	$174,179,200	.....
England	187,315,110	.....	178,688,985	.....
France	525,080,955	$224,477,890	511,498,610	$224,847,880
Germany	185,620,000	68,655,000	175,755,000	61,755,000
Spain	71,095,000	97,375,000	73,080,000	100,480,000
Neth'l'ds	24,251,500	33,047,000	19,713,000	32,274,500
Belgium	15,313,335	7,656,665	14,333.335	7,241,665
Italy	80,760,000	10,480,500	95,980,000	11,494,000
Russia	368,180,000	44,300,000	406,235,000	43,880,000
Austria-Hun'y	224,880,000	62,785,000	226,990,000	64,090,000

The returns of the Associated Banks of New York are of date August 22 and the others August 20, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver has been in good request at advancing prices. The sentiment has been in favor of better prices, and, aided by the good Indian demand, a higher level has been established.

The United States Assay Office in New York reports receipts of 41,000 oz. silver for the week.

The foreign trade of Great Britain in the seven months ending July 31 is valued by the Board of Trade returns as below:

	1902.	1903.
Imports	£306,790,912	£306,086,900
Exports	200,248,115	210,111,556
Excess, imports	£106,542,797	£95,975,344

This shows a decrease of £704,012 in imports, an increase of £9,863,441 in exports, and a resulting decrease of £10,567,453 in the excess of imports.

The movement of gold and silver for the seven months is reported as follows:

Gold:	1902.	1903.		Changes.
Imports	£12,849,327	£16,029,637	I.	£3,180,310
Exports	5,512,702	10,049,635	I.	4,536,933
Excess, imports	£7,336,625	£5,980,002	D.	£1,356,623
Silver:				
Imports	£4,727,346	£5,444,798	I.	717,452
Exports	5,701,891	6,064,303	I.	362,412
Excess, exports	£974,545	£619,505	D.	£355,040

Of the silver imported this year £4,120,580, or 75.7 per cent of the total, was from the United States.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.44	$0.46
Peruvian soles and Chinese pesos	.40	.44
Victoria sovereigns	4.86	4.88
Twenty francs	3.86	3.88
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

August.	Sterling Exchange.	—Silver— N. Y. Cts.	London Pence.	—Copper— Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	—Spelter— N. Y., Cts. per lb.	St. Louis, Cts. per lb.
20	4.85¾	55¼	25½	13¼@13⅜	13 @13¼	59¼	28¼	4.05 @4.10	5.80 @ 5.85	5.60 @ 5.65
21	4.858	55⅛	25⅛	13⅜@13⅝	13⅛ @13⅜	59⅛	28¼	4.05 @4.10	5.75 @ 5.80	5.55 @ 5.60
22	4.85¾	55⅛	25½	13⅜@13⅝	13⅛ @13⅜	....	28	4.05 @4.10	5.75 5.70	5.57½
24	4.85¾	55⅜	25⅝	13⅜@13⅝	13¼ @13½	59⅜	28	4.05 @4.10	@ 5.75 5.70	5.52½ @ 5.57½
25	4.86⅛	56⅛	25⅞	13⅜@13⅝	13¼ @13½	59⅜	27⅞ @ 28	4.05 @4.10	@ 5.75 5.70	5.52½ @ 5.57½
26	4.8610	56⅝	28 1/16	13⅜@13⅝	13¼ @13½	59	27⅞	4.05 @4 10	@ 5.75	5.52½ @5.57½

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars: the price of electrolytic cathodes is usually 0.25c. lower than these figures.

Copper.—The better feeling which we were able to report last week continues, and values have been well

maintained. More confidence is shown generally, buyers operating with more freedom. The closing quotations are 13⅜@13⅝c. for lake; 13¼@13½c. for electrolytic in cakes, wirebars or ingots; 13@13¼c. for cathodes and 12¾@13c. for casting copper.

The market for standard copper in London, which last week closed at £59 10s., opened on Monday at £59 7s. 6d., and the closing quotations on Wednesday are cabled as £58 17s. 6d.@£59 for spot and £58@£58 2s. 6d. for three months.

For refined and manufactured sorts we quote: English tough, £63 10s.@£64; best selected, £64@£64 10s.; strong sheets, £72 10s.@£73; India sheets, £69 10s.@£70; yellow metal, 6⅜@6½d.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week of August 25 and for the year to date, were in long tons.

Exports—	Week.	Year.
Austria	...	3,622
Belgium	...	937
France	452	12,550
Germany	330	16,424
Holland	325	24,046
Italy	55	1,856
United Kingdom	333	10,641
Other countries	...	3,700
Total copper	1,495	73,776
Matte	...	286
Imports—		
Copper	522	17,320
Matte	...	984
Ore	2,871	26,587

The movement is somewhat smaller than last week.

Imports and exports of copper in all forms in Great Britain, for the seven months ending July 31 are reported as below, in long tons; the totals giving approximate contents in fine copper:

	1902.	1903.	Changes.
Copper ore	56,981	51,345	D. 5,636
Matte and precipitate	43,901	44,393	I. 492
Fine copper	63,625	34,441	D. 29,184
Total fine copper	91,274	61,773	D. 29,501
Exports	29,737	30,160	I. 423
Balance	61,537	31,613	D. 29,924

Of the imports this year 336 tons ore, 3,129 tons matte, and 11,065 tons fine copper, were from the United States; against 558 tons ore, 9,889 tons matte, and 33,225 tons fine copper last year.

Tin has been dull and neglected, and transactions have been mostly of a retail character. The closing quotations are given as 27¾@27⅞c. for spot; 27⅝c. for September, and 27½c. for October.

The foreign market, which last week closed at £128 7s. 6d., opened £1 lower on Monday, and the closing quotations on Wednesday are cabled as £126 2s. 6d.@£126 5s. for spot and £124@£124 2s. 6d. for three months, prompt.

Imports of tin into Great Britain with re-exports of foreign tin, for the seven months ending July 31, are reported as below, in long tons of 2,240 lbs.:

	1902.	1903.	Changes.
Straits	15,358	12,887	D. 2,471
Australia	1,901	2,436	I. 535
Other countries	1,626	1,762	I. 36
Total imports	18,885	17,085	D. 1,800
Re-exports	13,189	11,775	D. 1,414
Net imports	5,696	5,310	D. 386

Re-exports were principally to America. The metal received from other countries is chiefly Bolivian tin.

Lead is quiet but steady, without any special feature. The ruling quotations are 4@4.02½c., St. Louis, and 4.05@4.10c., New York.

The foreign market is dull, Spanish lead being quoted £11 2s. 6d.@£11 5s., and English lead £11 5s.@£11 7s. 6d.

Imports and exports of lead in Great Britain for the seven months ending July 31 were as below, in tons of 2,240 lbs.:

	1902.	1903.	Changes.
United States	33,871	22,605	D. 11,266
Spain	58,203	59,798	I. 1,595
Australia	34,866	34,997	I. 131
Other countries	9,449	13,981	I. 4,532
Total imports	136,389	131,381	D. 5,008
Exports	19,887	19,243	D. 644
Balance	16,502	12,138	D. 4,363

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spanish Lead Market.—Messrs. Barrington & Holt write us from Cartagena, Spain, under date of August 8, that the price of silver for the week has been 13.75 reales per oz. Exchange remains unaltered at 34.35 pesates to £1. The local quotation for pig lead on wharf has been 60.50 reales per quintal, which on the current exchange is equivalent to £9 17s. 3d. per long ton, f. o. b. Cartagena. Exports of pig lead were 103,535 kgs. to France.

Spelter is in fair demand. Quotations are fractionally lower at 5.52½@5.57½c., St. Louis, and 5.70@5.75c., New York.

The foreign market is strong, good ordinaries being quoted £21 2s. 6d., and specials £21 7s. 6d.

Imports of spelter into Great Britain for the seven months ending July 31 were 50,221 long tons, as against 55,746 tons in the corresponding period last year. Imports of zinc manufactures were 12,595 tons, as against 12,724 tons in 1902. Exports of spelter were 4,433 tons, which compare with 5,054 tons in 1902.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write us from Cartagena, Spain, under date of August 8, that little is being done in zinc ore, as some miners are more inclined to accept produce prices, owing to the continued fall in spelter. Exports have been 1,900 tons blende to Antwerp.

Antimony is flat and pressed for sale. We quote: Cookson's, 7@7¼c.; Hallett's, 6⅞c.; United States, Italian and French, 6c.; Japanese, 5¾c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Quicksilver.—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotations are still $44.50@$46 per flask for domestic orders and $42@$43 for export. The London price is £8 12s. per flask, with the same quotation asked by second hands.

Imports of quicksilver into Great Britain for the seven months ending July 31 were 2,526,831 lbs., as against 2,374,441 lbs. in the same period in 1902. Re-exports of foreign metal were 968,738 lbs., as against 1,052,098 lbs. last year.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

	Per lb.		Per lb.
Aluminum No. 1, 99% ingots	33@37c.	Ferro-Tungsten (37%)	38c.
No. 2, 90% ingots	31@34c.	Magnesium, pure (N. Y.)	60c.
Rolled Sheets	4c. up	Magnesium	$2.75
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$1.82
Chromium, pure (N. Y.)	80c.	Phosphorus, foreign	45c.
Copper, red oxidd	50c.	Phosphorus, American	70c.
Ferro-Molyblu'm (50%)	$1.25	Sodium metal	53c.
Ferro-Titanium (10)	90c.	Tungsten (Best)	62c.
Ferro-Titanium (20@25% N. Y.)	55c.		

Variations in price depend on size of order.

Missouri Zinc Ore Market. Aug. 22.

(From Our Special Correspondent.)

The highest price paid for zinc during the week was $40 per ton for two bins, one on the Empire Reserve, and one on the Continental tract. The assay price remains from $35 to $37 per ton for concentrates assaying 60 per cent zinc. Lead is selling at $52.50 per ton on a steady market. A year ago lead brought only $49, and zinc $39.50 per ton. The scare over the shortage of mine powder has about blown over. More powder is arriving, and the local factory, recently blown up, has resumed production.

Following are the shipments of zinc and lead concentrates from the various camps of the Joplin district for the week ending to-day:

	Zinc, lbs.	Lead, lbs.	Total value.
Joplin	2,873,570	292,650	$59,405
Webb City-Carterville	2,000,220	201,160	40,285
Galena-Empire	954,760	86,740	18,815
Duenweg	825,040	69,010	17,075
Carthage	491,520	.....	9,340
Aurora	445,540	10,150	7,090
Prosperity	381,580	10,230	7,140
Alba-Neck	375,260	.....	6,940
Granby	300,000	21,500	3,550
Carl Junction	201,160	.....	3,720
Cave Springs	187,740	1,290	3,505
Spurgeon-Spring City	98,660	31,000	2,395
Zincite	108,780	890	2,035
Central City	95,170	15,540	1,980
Stotts City	96,000	.....	1,775
Oronogo	79,970	.....	1,160
Totals	9,514,970	740,160	$186,210
Total, 34 weeks	321,131,540	37,714,640	$6,520,955

Zinc value, the week, $166,915; 34 weeks, $5,504,590. Lead value, the week, $19,295; 34 weeks, $1,016,365.

Compared with last week the shipment was a decrease of 277,830 lbs. of zinc, and 357,840 lbs. of lead, the lead shipment being unusually small. Compared with the same week of last year the decrease in the sales was 767,090 lbs. zinc and 437,330 lbs. lead. For the 34 weeks of this year the shipment has been 32,198,640 lbs. of zinc and 3,227,970 lbs. of lead less than the same period of last year, but the value of this year's product is $347,675 greater than last year's.

Average Prices of Metals per lb., New York.

Month.	Tin.		Lead.		Spelter.	
	1903.	1902.	1903.	1902.	1903.	1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	29.81	27.77	4.567	4.075	5.550	4.37
May	29.51	29.85	4.325	4.075	5.639	4.47
June	28.34	29.36	4.210	4.075	5.697	4.96
July	27.68	28.38	4.075	4.075	5.662	5.27
August	.....	28.23	.....	4.075	.....	5.44
September	.....	26.60	.....	4.075	.....	5.49
October	.....	26.07	.....	4.075	.....	5.38
November	.....	25.68	.....	4.075	.....	5.18
December	.....	25.68	.....	4.075	.....	4.78
Year	.....	26.79	.....	4.069	.....	4.84

NOTE.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.681c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.; for June, 5.537c.; for July, 5.507c.

Average Prices of Copper.

Month.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1902.	1903.	1902.	1903.	1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	14.416	11.882	14.572	12.188	63 85	53,39
April	14.454	11.618	14.642	11.986	61.72	52.79
May	14.435	11.856	14.618	12.226	61.73	54.03
June	13.942	12.110	14.212	12.360	57.30	53.93
July	13.0 4	11.771	13.341	11.923	56.64	52.89
August	.....	11.404	.....	11.649	.....	51.96
September	.....	11.480	.....	11.760	.....	52.68
October	.....	11.449	.....	11.722	.....	52.18
November	.....	11.288	.....	11.553	.....	51.08
December	.....	11.430	.....	11.599	.....	50.95
Year	.....	11.626	.....	11.887	.....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903.		1902.		1901.	
	London, Pence.	N. Y. Cents.	London, Pence.	N. Y. Cents.	London, Pence.	N. Y. Cents.
January	21.98	45.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.23
April	23.38	50.56	24.34	52.72	27.30	59.29
May	24.89	54.11	23.71	51.31	27.43	59.64
June	24.29	52.86	24.17	52.36	27.42	59.57
July	24.86	53.92	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
Alaska-Mexican	Aug. 31	0.50	$760,440	$21,964,980
American Coal	Sept. 1	1.25	75,000	1,432,500
Bartolome de Medina, Mex.	Aug. 31	.65	1,300	74,348
Calumet & Hecla	Sept. 24	10.00	1,000,000	82,351,000
Camp Bird, Colo.	Sept. 1	.18	147,600	820,104
†General Chem., common	Sept. 1	1.25	92,629	1,207,908
†National Lead, pf.	Sept. 15	1.75	260,820	13,709,348
§Phila. Nat. Gas., pf.	Sept. 1	1.25	99,959	1,009,067
Standard Oil	Sept. 15	5.00	4,850,000	195,075,000
†U. S. Steel, com	Sept. 9	1.00	5,083,025	50,809,577

Monthly. †Quarterly. §Semi-annual.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
Annandale	Utah	..	Aug. 15	Sept. 12	.06½
Challenge Con.		..	Sept. 15	Oct. 6	.10
Chollar	Nev.	..	Sept. 17	Oct. 8	.10
Con. Cal. & Va.	Nev.	..	Aug. 28	Sept. 18	.25
Daylight	Utah	..	Aug. 28	Sept. 30	.01
Emerald	Utah	..	Aug. 15	Sept. 12	.00½
Hale & Norcross	Nev.	..	Aug. 31	Sept. 30	.10
Lucky Bill	Utah	..	Aug. 3	Sept. 7	.07½
Murray Hill	Utah	..	Sept. 5	Sept. 21	.03
New Redwing	Utah	..	Aug. 20	Sept. 10	.02
Ophir	Nev.	..	Sept. 15	Oct. 5	.15
Puget Sound Iron		..	Sept. 10	.....	.25
Savage	Nev.	..	Aug. 25	Sept. 15	.10
Shenandoah Con.	Cal.	..	Sept. 10	.....	.02
Skylark	Utah	..	Aug. 22	Sept. 8	.00½
Stockton	Utah	..	Aug. 31	Sept. 21	.01
Metallic Hill	Utah	..	Aug. 24	Sept. 10	.01
New Montezuma	Cal.	..	Sept. 10	.....	.02
Potosi	Nev.	67	Sept. 14	Oct. 6	.10
Wabash	Utah	4	Sept. 9	Oct. 5	.05

STOCK QUOTATIONS

NEW YORK.

Company and Location.	Par val	Shares Listed.	Aug. 19 H.	Aug. 19 L.	Aug. 20 H.	Aug. 20 L.	Aug. 21 H.	Aug. 21 L.	Aug. 22 H.	Aug. 22 L.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Sales.
Acacia, Colo.	1	1,433,000	.06	....	....	....	....	....	....	....	.06	....	....	....	1,000
Alta, Nev.	1		....	....	....	....	.05	....	....	....	.06	....	....	....	700
Amalgamated c., Mont	100	1,538,879	51	46½	47¼	44¼	49¼	46¼	48	46½	47⅝	46⅛	48⅞	46⅝	301,560
Anaconda c., Mont.	15	1,200,000	78⅞	76¼	75	74	76	....	....	....	75⅛	72	....	....	1,800
Anaconda Gold, Colo.	1	1,000,000	....	....	....	....	....	....	.13	....	....	....	....	....	300
Best & Belcher, Nev.	3	100,000	....	....	....	....	1.60	....	....	....	....	....	....	....	100
Brunswick, Cal.	1		....	....	....	....	.03	....	....	....	....	....	....	....	11,000
Caledonia, Nev.	2½		....	....	....	....	....	....	....	....	....	....	....	....	....
Challar, Nev.	100	112,030	....	....	....	....	....	....	....	....	1.10	....	....	....	400
Comstock, T., Nev.	2		....	....	.07	....	....	....	.07	....	....	....	07½	....	1,300
Com. T., Bonds, Nev	100		....	....	....	....	....	....	07½	....	....	....	....	....	1,000
Con.Cal.&Va.,g.s.,Nev	2½	216,000	1.45	....	....	....	1.45	....	1.40	....	....	....	1.50	....	1,350
Cons. Imperial, Colo.	1	500,000	....	....	....	....	.05	....	....	....	....	....	....	....	500
Creede & C. C., Colo.	1		....	....	....	....	....	....	02⅛	....	....	....	....	....	1,000
Crown Point, Nev.	3		....	....	....	....	....	....	....	....	.16	.15	....	....	1,000
Daly, Utah.	20		....	....	2.10	....	....	....	....	....	....	....	....	....	50
Dunkin, Col.	1		....	....	.08	....	....	....	....	....	....	....	....	....	500
Elkton, g., Colo.	1	1,250,000	....	....	.39	....	....	....	.39	....	.39	.37	....	....	649
El Paso, Colo.	1	900,000	....	....	....	....	....	....	.58	....	....	....	....	....	500
Golden Fleece, Colo.	0	600,000	.38	....	.08	....	....	....	....	....	....	....	....	....	800
Greene Con., c., Mex.	15	720,000	19⅛	19¼	19¼	18¾	19⅜	19¼	....	....	19⅛	19	19⅛	18¾	3,300
H rn Silver, Utah.	21	400,009	....	....	1.05	....	1.00	....	....	....	....	....	....	....	300
Isab lla, g., Colo.	1	2,500,000	.12	....	.12½	.12	....	....	....	....	....	....	.12½	....	1,000
Justice, Nev.	1	105,000	.14	....	....	....	....	....	....	....	....	....	....	....	500
Little Chief, Colo.	1		.08	....	....	....	....	....	....	....	....	....	....	....	300
Mexican, Nev.	3	100,800	1.05	....	....	....	....	....	....	....	1.10	....	1.05	....	400
Moon-Anchor, Colo.	5	600,000	.03	....	....	....	....	....	....	....	....	....	....	....	2,000
Occidental, Nev.	3	1,000,000	....	....	....	....	.40	....	....	....	....	....	....	....	200
Ophir, Nev.	1	100,800	1.60	....	....	....	....	....	1.70	....	1.55	....	....	....	400
Pharmacist, Colo.	1		....	....	.04	....	....	....	....	....	.03	....	.03	....	*2,300
Phœnix, Ariz.	1	1,500,000	....	....	....	....	.04	....	....	....	....	....	....	....	200
Portland, Colo.	10	3,000,000	1.18	....	....	....	....	....	....	....	....	....	1.19	1.18	300
Potosi, Nev.	3	112,000	....	....	....	....	.14	....	....	....	....	....	.18	.17	700
Quicksilver, Cal.	100		....	....	....	....	....	....	....	....	....	....	....	....	....
Savage, Nev.	2⅛	112,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Nevada, Nev.	3	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Hill, Nev	1	180,000	....	....	....	....	.75	....	....	....	....	....	.70	....	200
Standard, Cal.	10		....	....	....	....	....	....	....	....	....	....	....	....	....
Tenn., c., Tenn.	25	175,000	....	....	....	....	....	....	....	....	....	....	....	....	200
Union Con., Nev.	2½	10 ,000	.78	....	....	....	29¼	29	....	....	....	....	.68	....	600
Union Cop., N. C.	10	300,000	....	....	....	....	....	....	....	....	.70	....	.01	....	3,500
Uni'd Cop. com., Mont	100	450,000	15½	....	15½	....	15¾	....	15¾	....	15¾	....	15¾	....	500
White Knob, g. s., Ind.	100	150,0.0	11½	....	11½	11	....	....	....	....	12	....	11⅛	11½	966
Work, Colo.	1		....	....	....	....	....	....	....	....	....	....	....	....	....
Yellow Jacket, Nev.	3	120,000	....	....	....	....	.58	....	....	....	....	....	....	....	200

Total sales 344,686 shares. † Ex-Dividend

COLORADO SPRINGS (By Telegraph).

Name of Company.	Aug. 24. H.	Aug. 24. L.	Aug. 25. H.	Aug. 25. L.	Name of Company.	Aug. 24. H.	Aug. 24. L.	Aug. 25. H.	Aug. 25. L.
Acacia	....	....	....	....	Isabella	....	....	.11	.10½
Am. Con	....	....	....	....	Jack Pot	....	....	....	....
Anaconda	....	....	11½	.10½	Keystone	....	....	.04	.03⅝
Blue Bell	....	....	.05	.03	Last Dollar	....	....	....	....
Cripple Creek Con	....	....	.04¾	.03½	Lexington	....	....	....	....
C. K. & N.	....	....	17¾	.17	Little Puck	....	....	....	....
Doctor Jack Pot	....	....	....	....	Mollie Gibson	....	....	.05½	.04
Elkton Con	....	....	.41	.40¼	Moon Anchor	....	....	....	....
El Paso	....	....	.60	.58½	Old Gold	....	....	.03½	.03⅛
Findley	....	....	....	....	Pharmacist	....	....	....	....
Gold Dollar Con	....	....	.64⅛	.04	Pinnacle	....	....	....	....
Golden Cycle	....	....	.67	.65½	Portland	....	....	1.23	1.20
Golden Fleece	....	....	....	....	Vindicator	....	....	....	....
Gould	....	....	....	....	Work	....	....	.05¾	.05½

COLORADO SPRINGS, COLO.*

Name of Company.	Par Val	Shares Listed.	Aug. 15 H.	Aug. 15 L.	Aug. 17 H.	Aug. 17 L.	Aug. 18 H.	Aug. 18 L.	Aug. 19 H.	Aug. 19 L.	Aug. 20 H.	Aug. 20 L.	Aug. 21 H.	Aug. 21 L.	Sales
Acacia	$1	1,500,000	.05¼	.05	.05⅜	.05¼	.05⅜	.05¼	.06	.05⅜	.06	.05½	.06	.05⅝	5,000
Am. Con.	1	2,000,000	.02½	....	.02½	....	.02½	....	.02½	....	.02½	....	.02½	....	....
Anaconda	5	1,000,000	.11	.10¼	.10	....	.10⅞	.10¼	.10½	.10	.10¼	....	.11	.10	500
Ben Hur	1	900,000	.02½	....	.02	....	.02	....	.02	....	.02	.01⅜	.02	.01⅜	1,000
Blue Bell	1	1,000,000	.04½	....	.04	....	.04	....	.04½	....	.04½	....	....	....	....
C. C. & M.	1	1,000,000	.02¾	.02¼	.02¼	.02⅛	.02¼	.02¼	.02¼	.02	.02¼	.02⅛	.02¼	.02⅛	4,005
C. K. & N.	1	1,250,000	.18⅞	....	.18⅝	.18	.18	.17½	.18¼	.17	.18	.17	.18	.17½	3,000
C. C. Con.	1	2,000,000	.04¼	.03⅞	.03½	....	.04	.03⅜	.04⅛	.03¾	.04½	.03½	.04¼	.03⅞	2,000
Coriolanus	1	1,500,000	.02	....	.02½	....	....	....	.02½	....	.02½	....	.02½	....	....
Des Moines	1	750,000	.02	....	.02½	....	.02½	....	.02½	....	.02½	....	.02½	....	....
Dr. Jack Pot	1		.09	.08¼	.09	....	.08¾	.08	.08⅜	.08¼	.08½	.08¼	.08¾	.08	3,000
Elkton Con.	1	1,250,000	.41	.39	.41	.39	.41	.39	.41	.39	.40	.39	.40½	.39	1,500
El Paso	1	900,000	.54	.52	.54	.50¼	.54	.53¼	.55	.54	.59	.54¾	.59	.55	8,500
Fannie Rawlings	1	1,000,000	.02	....	.02½	.02	.02	....	.02½	....	.02	....	.02⅜	....	....
Findley	1	1,250,000	.14¼	.13	.14	....	.13¾	....	.13¾	....	.13¾	....	.14	....	....
Gold Bond	1	1,000,000	.02	....	.02	....	.02	....	.02	.01¾	.02	.01½	.02	.01½	....
Gold Dollar Con.	1		.04¼	.04	.04⅜	.03½	.04¼	.03⅝	.04¼	.03¾	.03⅝	....	.04⅛	.03¾	4,800
Golden Cycle	1	2,000,000	.69	....	....	....	....	....	....	....	....	....	....	....	5,000
Golden Fleece	1	600,000	.10	.03	.25	....	.25	.03	.15	.05	.12	.06	....	....	....
Gould	1	1,250,000	.02¼	....	.02½	....	.02	....	.02	....	.02	....	.02	....	....
Hart	1	1,000,000	.02	....	.02	....	.05	.02	.04	.02	.04	.02	.02	....	....
Isabella	1	2,500,000	.12	....	.10⅜	.10	.10¼	.10	.10¼	.10	.10¼	.10	.10¼	.10	11,500
Jack Pot	1	1,250,000	.03¼	....	.05	....	....	....	.10	.05	....	....	.05¼	....	....
Last Dollar	1	1,500,000	.50	.48	.50	....	.50	....	.50	....	.50	....	.50	....	....
Lexington	1	1,500,000	.03½	.03	.03½	.03¼	.03½	.03⅜	.03⅜	.03½	.03½	.03	.03½	.03¼	1,000
Little Puck	1	2,000,000	.03	.02	.04	.02	.03	.02	.03	.02	.03	.02	....	....	....
Mollie Gibson	5	1,000,000	.05½	....	.05½	....	.05½	....	.05½	....	.05½	....	....	....	....
Moon-Anchor	1	600,000	.09	.08¼	.03	.08½	.09	.08¼	.09	.08½	.09¼	.08½	.09¼	.09	1,000
New Haven	1	1,500,000	.02¾	.02¼	.02½	.02	.02½	.02¼	.02⅜	.02¼	.02½	.01¼	.02⅜	.02⅛	....
Pharmacist, Con.	1	1,500,000	.03¼	.03	.04	.03⅛	.03¼	.03	.03½	.03	.03⅜	.03	.03¾	.03	3,000
Pinnacle	1	2,000,000	.03⅜	....	.03½	....	.03½	....	.03½	....	.03⅜	....	.03½	....	....
Pointer	1	1,250,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Portland	1	3,000,000	1.29	1.20	1.23	120½	1.25	1.18	1.30	1.20	1.30	1.20	1.25	1.20	1,000
Prince Albert	1	3,000,000	.02	....	.02½	.01½	.02½	.01½	.02½	.01⅝	....	....	.02½	.01½	....
Vindicator	1	1,500,000	.90	....	.90	....	.90	....	.90	....	....	....	.90	....	....
Work	1	1,500,000	.05¼	.04⅜	.05½	.04⅜	.05¼	.05	.05¼	.05	.05¼	.04⅝	.05⅜	.05	8,000

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 63,800 shares.

SAN FRANCISCO (By Telegraph).

Name of Company.	Shares Issued.	August. 24.	August. 25.	Name of Company.	Shares Issued.	August. 24.	August. 25.
Belcher	104,000	.31	.30	Justice	105,000	.11	.10
Best & Belcher	100,800	1.70	1.70	Mexican	100,800	1.05	1.05
Caledonia	100,000	1.00	.98	Occidental Con	100,000	.42	.41
Challenge Con.	50,000	.27	.26	Ophir	100,800	1.65	1.65
Chollar	112,000	.17	.16	Overman	115,200	.26	.26
Confidence	24,960	.95	.95	Potosi	112,000	.17	.16
Con. Cal. & Va.	216,000	1.50	1.53	Savage	112,000	.25	.24
Con. Imperial	500,000	.03	.03	Sierra Nevada	100,000	.67	.66
Crown Point	100,000	.15	.15	Union Con	100,000	.68	.67
Gould & Curry	108,000	.33	.32	Utah Con	100,000	.22	.20
Hale & Norcross	112,000	.46	.43	Yellow Jacket	120,000	.56	.56¼

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val.	Shares Issued.	Aug. 19 H.	Aug. 19 L.	Aug. 20 H.	Aug. 20 L.	Aug. 21 H.	Aug. 21 L.	Aug. 22 H.	Aug. 22 L.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Sales
Allis-Chalmers, U. S.	$100		....	....	....	....	....	....	....	....	....	....	....	....	....
Allis-Cham's, pf, U. S.	100	200,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem., U. S.	100		....	....	....	....	....	....	....	....	....	....	....	....	....
Am.Agr.Chem.pf,U.S.	100	181,350	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref., U. S.	100	500,000	46⅛	44⅞	45½	44½	45¼	44⅛	44¼	43⅞	44½	....	45½	45	10,710
Am.Sm. & Ref.,pf,U.S.	100	500,000	....	....	90	....	90½	....	....	....	90⅜	90	....	....	1,760
Am. Steel & Fdy.,U.S.	100		....	....	....	....	10	....	....	....	....	....	10	....	200
Am. S. & Fdy., U. S.	100	155,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Col. Fuel & I., Colo.			....	....	....	....	....	....	....	....	....	....	....	....	....
Col. Fuel & I., Colo.	100	239,320	....	....	....	....	53¼	48	....	....	....	....	49½	46	1,800
Col. & H. C. & I., Colo.	100	69,244	....	....	15	14	....	....	14¾	....	....	....	....	....	600
†Crucible Steel, U. S.	100	250,000	11	10¾	10⅝	10½	10½	10⅜	....	....	10⅛	9	9¼	8⅞	5,357
†CrucibleSteel,pf,U.S.	100	250,000	73¼	73	73	72½	72½	....	72	71½	71	70	70½	70	706
†Mong. R. Coal, Pa.	50	200,000	10¾	....	....	....	....	....	....	....	....	....	....	....	150
†Mong. R. Coal, pf, Pa.	50	98,300	....	....	....	....	37⅞	....	37¾	....	37⅛	....	38	37½	130
National Lead, U. S.	100	149,054	16	....	....	....	....	....	16	....	....	....	....	....	200
National Lead, pf, U.S.	100	149,040	85¼	....	....	....	....	....	....	....	....	....	85	....	110
†Phila. Nat. Gas,	100	308,542	....	....	....	....	40	....	....	....	....	....	39½	....	306
†Phila. Nat. Gas, pf.	100	212,873	....	....	....	....	....	....	....	....	....	....	....	....	....
†Pittsburg Coal, Pa.	100	300,307	31	29⅞	30¼	30	30¾	30¼	30¼	30¼	32⅛	30¼	32¼	32	9,454
†Pittsburg Coal,pf,Pa.	100	297,012	85	84	84	83	83½	83	82¾	82	82	81½	82¾	82	1,543
Republic I. & S., U. S.	100	273,520	12½	12	11⅞	11⅛	11¾	11⅜	....	....	....	....	....	....	2,700
Republic I.&S.,pf,U.S.	100	203,569	67	66	65⅜	65	65⅞	65¼	....	....	65¾	65	....	....	2,800
Sloss-Shef S. & I., Ala.	100	75,000	35	34	33½	33	34	....	....	....	....	....	....	....	1,100
Sloss-ShefS.&I.pf,Ala.	100	65,085	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard Oil, U. S.	100	970,000	612½	610½	610	....	‡610	....	....	....	616	607	....	....	176
Tenn. C.I. & R.R.	100	225,000	44½	41¾	42¾	41	44¼	41½	41½	41	42	40	42¼	40⅝	20,570
U.S. Red. & Ref., U. S.	100	59,188	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S.Red&Ref.,pf, U.S.	100	39,485	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S. Steel Corp., U. S.	100	5,084,952	24⅜	22½	22¾	21⅞	23⅜	21½	22	21⅝	22⅜	21¾	22¼	22⅛	148,282
U.S. SteelCrop.pf,U.S.	100	5,103,141	73	71⅛	71½	70⅜	71¾	69¼	70⅛	69¼	70⅜	69⅝	70¾	70¼	58,960
Va.-Car Chem., U. S.	100	279,844	23¼	22	23¼	22¾	25	24	24	23½	24	22¾	23	....	12,220
Va.-Car Chem.,pf,U.S.	100	120,000	....	....	....	....	95	....	....	....	....	....	....	....	100

*New York Stock Exchange. †Pittsburg Stock Exchange. ‡Ex-dividend. Total sales 280,274 shares.

BOSTON, MASS.*

Name of Company.	Par val	Shares listed	Aug. 19 H.	Aug. 19 L.	Aug. 20 H.	Aug. 20 L.	Aug. 21 H.	Aug. 21 L.	Aug. 22 H.	Aug. 22 L.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Sales.
Adventure Con., c.	$25	100,000	⅛	....	‡⅛	6	6¼	6	6½	....	6	....	....	....	555
Alloucz	25	99,511	6	5¾	5½	5¼	5½	....	....	....	....	....	....	....	980
Amalgamated, c.	100	1,538,879	50¾	46⅝	....	....	49¼	46¾	48	46⅜	47½	....	48¾	46¾	31,630
Am. Gold Dredging	5	90,000	....	....	1	....	....	....	....	....	....	....	....	....	200
Am. Z. L. & Sm.	25	60,000	....	....	....	....	....	....	....	....	....	....	8½	....	100
Anaconda	25	1,200,000	19	....	....	....	....	....	....	....	....	....	....	....	10
Arcadian, c.	25	150,000	2¼	2	2	1½	1⅞	1½	1½	....	1⅞	....	....	....	762
Arnold	25	60,000	50	....	....	....	....	....	....	....	....	....	....	....	100
Atlantic, c.	25	100,000	....	....	....	....	....	....	....	....	9	....	9	....	205
Bingham Con., g. s.	50	150,000	26	25	....	....	25¼	25½	25⅛	25	25	....	26¼	25	3,208
Bonanza	10	300,000	....	....	....	....	....	....	50	....	....	....	....	....	10
British Columbia	5	256,500	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal. & Helca, c.	25	100,000	450	440	450	444	450	....	....	....	....	....	450	....	29
Centennial, c.	25	90,000	22	17½	19½	17	21	18¾	19⅝	19	19½	18¾	21	19¾	15,286
Central Oil	25	60,000	....	....	8	....	....	....	....	....	....	....	8	....	60
Con. Mercur, g.	5	1,000,000	1⅛	1½	1⅛	1⅜	1⅛	....	....	....	1½	....	....	....	2,005
Copper Range Con.	100	285,000	65	55	59	50¾	64¼	59½	61¾	60	62	57½	63⅞	66	95,785
†Daly-West	20	180,000	41¼	41	41	40½	40½	40	40½	40	40½	....	40	....	892
Dominion Coal	100	150,000	81	78	80¼	79	81	80¾	80½	80	80	79	80	....	1,743
Dominion Coal, pf.	100	30,000	110	....	....	....	....	....	....	....	....	....	110¼	....	30
Dominion I. & S.	100	100,000	9¾	9¼	....	....	9½	9¼	....	....	9	....	9½	....	685
Elm River	12	100,000	3¾	3	3	2⅝	2⅞	....	....	....	2¾	....	3	2⅝	675
Franklin, c.	25	100,000	8¾	....	8¾	8¼	8	....	8¾	....	8¾	....	....	....	300
Granby Con.	10	1,336,303	4	....	4	....	4⅛	....	....	....	....	....	4	....	1,505
Guanajuato Con.	5	385,000	....	....	....	....	....	....	....	....	1	....	1	....	155
Isle Royal Con., c.	25	385,000	8	7½	7½	....	7⅛	....	....	....	8	....	7½	....	510
Mass Con., C.	25	100,000	6	5½	6	....	6	5½	5	....	5	....	....	....	835
Mayflower, c.	25	100,000	1	....	....	....	1½	1	....	....	....	....	....	....	410
†Michigan, c.	25	100,000	8	....	9	....	8¼	8	....	....	....	....	....	....	70
Mohawk, c.	25	100,000	45½	41½	42	39	43¾	41	41½	41	42	....	43¾	42	2,754
Mont. Coal & Coke	25	200,000	4	....	4	....	....	....	....	....	....	....	....	....	100
Mont'l & Boston, c.	5	570,000	1	....	....	....	100	93¾	1⅛	1	1	87½	....	....	1,000
New Idria	5	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Nova Scotia St. & C.	100	37,623	....	....	....	....	....	....	....	....	....	....	....	....	....
Nova Scotia St.&C., pf.	100	16,300	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony, c.	25	100,000	....	....	1½	....	....	....	....	....	....	....	1¾	1	75
Old Dominion, c.	25	150,000	11	10	10¼	10	10	....	....	....	10	....	11	....	350
Osceola, c.	25	96,150	61	57	58	54	62	58	59	....	57½	....	61½	59½	1,471
Parrott, s. c.	10	229,850	22½	20¾	20	18½	21	20	....	....	....	....	22	20	1,274
Phœnix Con, c.	25	100,000	5	....	5½	....	5½	5	5½	....	5½	5⅛	....	....	455
Quincy, c.	25	100,000	98	....	....	....	95	....	90	....	....	....	....	....	60
Rhode Island, c.	25	100,000	2	1½	2	1½	2	1¾	....	....	....	....	....	....	778
Santa Fe, g. c.	10	250,000	....	....	....	....	....	....	1⅜	....	....	....	1⅜	....	250
Shannon, c.	10	188,153	12⅛	11½	11⅜	11	11¾	11¼	11½	....	11⅜	11½	12	11¾	3,420
Tamarack, c.	25	60,000	106	....	....	....	....	....	....	....	....	....	....	....	3
Tecumseh	25	80,000	....	....	50	....	....	....	....	....	....	....	....	....	200
Tennessee	25	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Trimountain	100	450,000	83	82	81½	80	82½	80	81½	81	81½	81	81¾	80½	970
Trinity, c.	25	419,000	6⅛	5¾	....	....	6¼	....	6¼	6	6¼	6	6¼	6¼	3,984
United c.	25	240,000	....	....	....	....	....	....	....	....	....	....	....	....	....
United States, g.	10	300,000	....	....	19¾	19	20½	20	19¾	....	19⅝	19½	20	19½	7,376
U. S. Coal & Oil	25	100,000	11⅜	11½	11¼	11	11¾	11¼	....	....	....	....	....	....	1,315
Utah Con., g.	25	100,000	28¾	24	27½	26	28	27	27½	....	27	26¾	27¾	27	2,242
†Victoria	25	60,000	4½	4	4¼	4	4	....	4	....	....	....	....	....	735
Winona, c.	25	100,000	9½	8⅞	8¾	8	9⅛	9	....	....	....	....	9¼	9	2,035
Wolverine, c.	25	60,000	....	....	68	....	....	....	70	....	....	....	72	....	65
Wyandot	25	100,000	1¼	....	1	....	....	....	....	....	....	....	1⅜	....	435

*Boston Stock Exchange. †Ex Dividend. ‡Assessment Paid. Total sales, 190,092 shares.

SAN FRANCISCO.*

Name of Company.	Location.	Capitalization.	Aug. 14 H.	Aug. 14 L.	Aug. 15. H.	Aug. 15. L.	Aug. 17. H.	Aug. 17. L.	Aug. 18 H.	Aug. 18 L.	Aug. 19 H.	Aug. 19 L.	Aug. 20 H.	Aug. 20 L.	Sales
Central Eureka	Cal.	$400,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Colchan	Nev.	1,000,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Esperanza	Nev.	1,000,000	.05	.04	....	....	.04	....	.04	....	....	....	....	....	1,100
Gipsy Queen	Nev.	750,000	.27	....	....	....	....	....	....	....	....	....	....	....	300
Gold Mtn. Con.	Nev.	750,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Lucky Tom	Nev.	1,000,000	....	....	....	....	....	....	....	....	....	....	....	....	....
MacNamara	Nev.	500,000	.21	....	....	....	....	....	.20	....	....	....	.20	....	1,550
Mont-Tonopah	Nev.	1,000,000	1.10	1.07½	....	....	1.12½	1.07½	1.12½	1.10	....	....	1.10	....	2,100
New York Tonopah	Nev.	1,000,000	....	....	....	....	....	....	....	....	....	....	....	....	500
Paymaster	Nev.	750,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Rescue	Nev.	500,000	.12	.11	....	....	....	....	....	....	....	....	.10	....	1,300
Tonopah-Belmont	Nev.	2,000,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Tonopah & Cal.	Nev.	2,000,000	.39	.38	....	....	.37	.36	.36	.35	....	....	.35	....	2,300
Tonopah Fraction	Nev.	750,000	....	....	....	....	....	....	....	....	....	....

STOCK QUOTATIONS

MEXICO*. Aug. 14

Name of Company.	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango:				
Ca. Min. de Penoles	2,500	$50.00	$3,800	$4,100
San Andres de la Sierra	200	.....	10,000	.....
Guanajuato:				
Angustias, Pozos	2,400	5.00	100	110
Cinco Senores y An., aviadoras	2,000	15.00	200	205
Cinco Senores y An., aviada	400	10.00	180	190
Providencia, San Juan de la Luz	6,000	2.00	150	155
Queensland y Australia	300	.....	80	95
Guerrero:				
Delfina, 1st serie	2,500	.....	40	45
Delfina, 2nd serie	2,500	.....	32	35
Garduno y Anexas	7,200	.....	45	60
Hidalgo:				
Amistad y Condordia	9,600	8.87	88	90
Carmen, aviada	1,100	.....	150	160
Guadalupe Fresnillo Mill	1,000	.....	180	250
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora	1,536	.....	.....	.....
La Blanca, aviada	768	.....	.....	.....
La Reina y An., aviadora	5,600	.....	22	24
Luz de Maravillas, aviadas	1,100	.....	.....	20
Maravillas y An., aviador	1,680	.....	120	180
Maravillas el Lobo	1,000	.....	130	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10.00	.....	.....
Refugio, aviada	12,800	.....	6	8
Santa Anay An., aviadora	1,800	.....	30	40
Santa Anay An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	11½	13
Sta. Gertrudis y An., aviadora	28,800	1.00	90	91
Santo Tomas Apostol aviadoras	5,100	.....	2	3
San Felipe de Jesus, aviadora	3,600	.....	25	28
San Felipe de Jesus, aviada	1,200	.....	10	15
San Rafael y An., Trompillo	1,200	12.00	1,430	1,440
San Rafael y An., aviada	1,200	4.00	580	590
Soledad, aviada	960	5.00	435	446
Sorpresa, aviada	960	5.00	325	340
Mexico:				
Alacran	2,400	.....	.....	60
Aldebarren	.....	.....	180	195
Buen Despacho	2,000	.....	105	120
Dos Estrellas	3,000	30.00	3,500	3,550
La Esperanza (El Oro.)	3,000	10.00	.....	1,500
La Reformia, aviadores	2,000	.....	85	90
Providencia, pagadoras	1,800	.....	.....	.....
Providencia, liberadas	900	.....	.....	.....
Santa Ana, Esperanza	2,400	.....	70	90
Michoacan:				
Luz de Borda, aviadora	3,000	.....	135	145
Luz de Borda, aviado	1,000	.....	55	70
Nuevo Leon;				
La Fraternal	1,000	.....	550	600
Norias de Bajan	1,000	.....	800	850
Santiago y An., Tlal.	4,000	.....	.....	.....
San Luis Potosi:				
Concepcion y An.	3,000	.....	85	95
El Barreno, aviadora	2,000	2.00	35	36
Sta. Maria de la Paz	2,400	20.00	700	720
San Diegoy Annexas	2,400	4.00	18	22
Zacatecas:				
Asturiana y An.	2,500	.....	55	60
Candelaria y Pinos	2,500	10.00	200	220
Cubiertas	2,400	.....	.....	.....
Esperanza y An.	2,400	.....	30	40
Lourdes	2,500	.....	25	40
Luz de Minillas, pagadoras	2,000	.....	10	15
Nueva Quebradilla, aviadoras	2,400	.....	90	95
Nueva Quebradilla, aviadas	600	.....	60	80
San Carlos y Annexas	2,500	20.00	150	160
Sta. Maria de Gaud	2,500	10.00	75	85
Miscellaneous:				
Bartolome de Medina	2,000	1.50	70	73
Guadalupe Hacienda	20,000	6.00	.....	.....
La Luz Hac. (Pachuca.)	3,750	.....	.....	.....
La Reina (Chihuahua.)	192	.....	.....	.....
Naica (Chihuahua.)	100	.....	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	10.00	1,000	1,080
Natividad (Oaxaca) aviadas	600	4.00	.....	.....
San Francisco Hac.	6,000	1.00	57	58
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	5.00	225	240

*Values are in Mexican currency.

LONDON. Aug. 13

Name and Country of Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
		£. s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	3 0	Apr., 1903	4 7 6	4 12 6
Anaconda, c. s., Montana	1,200,000	5 0 0	2 0	May, 1903	3 15 0	3 17 6
Arizona, c., Def., ord.	63,444	1 0 0	5 6	Aug., 1903	7 0 0	7 10 0
Arizona, pref., ord	316,350	1 0 0	5 6	Aug., 1903	7 2 6	7 7 6
Camp Bird, g., Colorado	738,000	1 0 0	.. 9	Sept. 1903	1 6 3	1 8 9
Central Chile, C., Chile	276,248	1 0 0	.. 6	Jan., 1902	3 0	4 0
Copiapo, c., Chile	112,500	2 0 0	6 10	May, 1903	1 7 6	1 12 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	10 0	12 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	July. 1903	1 11 3	1 13 9
Frontino & Bolivia, g., Columbia	128,682	1 0 0	3 0	July, 1901	16 3	18 9
Le Roi, g., British Col.	200,000	5 0 0	5 0	Nov., 1899	16 3	18 9
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	1 1 3	1 3 9
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	2 6	3 6
Montana, g. s., Montana	657,128	1 0 0	6	April 1899	1 9	2 3
Mountain, c., Cal.	250,000	5 0 0	2 4½	May. 1903	2 17 6	3 2 6
Stratton's Independence, Colorado	1,000,007	1 0 0	1 0	Aug., 1903	7 6	8 0
St. John del Rey., g., Brazil	546,265	1 0 0	8	June, 1903	15 0	16 0
Utah Con., g. c. (Highland Boy), Utah	300,000	1 0 0	6 3	July, 1903	5 0 0	5 10 0
Ymir, g., British Col.	200,000	1 0 0	1 0	Mar., 1902	5 0 0	7 6
European:						
Linares, l., Spain	15,000	3 0 0	1 0	Mar., 1903	2 0 0	2 10 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	11 0	May, 1903	3 10 0	3 15 0
Rio Tinto, c., Spain	325,000	5 0 0	27 6	May, 1903	48 17 6	47 2 6
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	May, 1903	6 2 6	6 7 6
Tharsis, c., Spain	625,000	2 0 0	6 0	May, 1903	3 17 6	4 2 6
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,388	1 0 0	2 0	July, 1903	1 17 6	2 0 0
Briseis, Tin, Tasmania	600,000	1 0 0	.....	.....	4 6	5 6
Broken Hill Pr'p, s., N. S. Wales	960,000	8 0	1 0	Aug., 1903	1 9 0	1 10 0
Cosmopolitan Prop., W. Australia	385,000	1 0 0	1 0	May, 1903	15 6	16 6
*Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Apr., 1903	7 10 0	7 12 6
*Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Apr., 1903	7 10 0	7 12 6
Great Bo'd'r Pr'p, W. Australia	1,750,000	2 0	6	June, 1903	1 6 6	1 7 0
Ivanhoe Gold Corp., W. Australia	200,000	5 0 0	4 0	Apr., 1903	7 18 9	8 1 3
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	July, 1903	4 0 0	4 2 6
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 5 0	2 7 6
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	1 0	July, 1903	3 0 0	3 2 6
*Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Aug., 1903	2 17 6	3 0 0
Waihi, g., New Zealand	497,412	1 0 0	2 6	June, 1903	5 3 9	5 6 3
Indian:						
Champion Reef, g., Colar Fields	473,000	10 0	5 6	Aug.. 1903	7 13 9	7 16 3
Mysore Gold, Colar Fields	566,043	10 0	4 0	July, 1903	6 17 6	7 0 0
*Nundydroog, g., Colar Fields	484,000	10 0	1 6	Mar., 1903	2 8 9	2 11 3
*Ooregum, g., Colar Fields	343,000	10 0	1 9	Aug., 1903	1 11 3	1 13 9
*Ooregum, g., pref., g., Colar Fields	240,000	10 0	1 9	Aug., 1903	2 0 0	2 2 6
African:						
Angelo, g., Transvaal	600,000	1 0 0	6 0	Aug., 1903	7 2 6	7 7 6
*Bonanza, g., Transvaal	200,000	1 0 0	10 0	Aug., 1903	3 11 3	3 13 9
British South Africa	4,436,019	1 0 0	rts.	May, 1889	2 13 9	2 15 0
Cape Copper, S. Africa	300,000	2 0 0	1 0	July, 1903	2 8 9	2 11 3
Cape Copper, pref., S. Africa	75,000	2 0 0	1 0	July, 1903	2 7 6	2 12 6
City and Sub'n (New), g., Transvaal	340,000	4 0 0	4 0	Aug., 1903	6 12 6	6 17 6
Crown Reef, g., Transvaal	120,000	1 0 0	4 0	Aug., 1903	17 5 0	17 15 0
De Beers Con., d., pref., Cape Colony	800,000	2 10 0	10 0	Aug., 1903	19 1 3	19 3 9
De Beers Con., def.	1,000,000	2 10 0	15 0	Aug., 1903	19 13 9	19 16 3
*East Rand, Prop., Transvaal	970,000	1 0 0	5 0	Aug., 1903	7 7 6	7 10 0
*Ferreira, g., Transvaal	90,000	1 0 0	15 0	Aug., 1903	20 15 0	21 5 0
*Geldenhuis Est., g., Transvaal	200,000	1 0 0	6 0	Aug., 1903	6 6 3	6 8 9
Geduld, g., Transvaal	400,000	1 0 0	rts.	Mar., 1902	6 12 6	6 13 9
*Henry Nourse, g., Transvaal	125,000	1 0 0	10 0	Aug., 1903	8 5 0	8 10 0
Jagersfontein, d., Orange, F. S.	200,000	5 0 0	6 0	Nov., 1889	28 17 6	29 2 6
Jubilee, g., Transvaal	50,000	1 0 0	5 0	July, 1903	5 2 6	5 7 6
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	3 10 0	3 15 0
*Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Aug., 1903	3 17 6	4 0 0
May Con., g., Transvaal	288,750	1 0 0	3 0	Aug., 1903	4 1 3	4 3 9
*Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Aug., 1903	5 2 6	5 7 6
Modderfontein, g., Transvaal	290,000	1 0 0	rts.	Apr., 1902	9 16 3	9 18 9
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1903	2 17 6	3 2 6
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Aug., 1903	3 17 6	4 0 0
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	10 2 6	10 3 9
*Robinson, g., Transvaal	750,000	5 0 0	5 6	Aug., 1903	10 0 0	10 5 0
Robinson Deep, g., Transvaal	950,000	1 0 0	2 0	Aug., 1903	4 12 6	4 17 6
*Rose Deep, Transvaal	425,000	1 0 0	2 0	Aug., 1903	8 2 6	8 7 6
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar, 1899	2 5 0	2 10 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1599	17 6	8 18 9
Village Main Reef, Transvaal	400,000	1 0 0	4 0	June, 1903	7 17 6	2 6
Wemmer, Transvaal	80,000	1 0 0	10 0	July, 1903	11 0 0	11 10 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. Ex-Dividend.

TORONTO, ONT.* Aug. 24.

Name of Company.	Par val	Prices. High.	Prices. Low.	Sales.	Name of Company.	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.04	.02	.....	Granby Smelter	$10	4.50	3.70	.....
Cariboo (Mc. K.)	1	.13	.....	.....	Mountain Lion	1	.28	.20	.....
Cariboo (Hyd.)	1	.75	.....	.....	North Star	1	.14	.11	.....
Center Star	1	.29	.24	.....	Nova Scotia Steel, com	100	89.00	85.00	.....
Crows Nest, C.	100	3.50	2.75	.....	Payne	1	.20	.16	.....
Dominion Coal, com.	100	87.50	79.00	25	Rambler Cariboo	1	.40	.30	.....
Dominion S. & I.	100	10.50	8.00	.....	Republic	1	.03	.01	.....
					St. Eugene	1	.48	.40	.....
Fairview	1	.05	.03	.....	Virtue	1	.07	.05	.....
Giant	1	.03	.02	.....	War Eagle Con	1	.14	.10	.....
Deer Trail	1	.03½	.01½	.....	Sullivau	1	.06	.04	.....
Iron Mask	1	.06	.....	.....	Wiuuipeg	1	.04	.....	.....
Morrison	1	.04	.02	.....	Wonderful	1	.04	.....	.....

*Standard Stock and Mining Exchange. Total sales, 25 shares.

LONDON (By Cable.)*

Name of Company.	August 18. £. s. d.	August 25. £. s. d.	Name of Company.	August 18. £. s. d.	August 25. £. s. d.
Anaconda	4 2 6	4 2 6	Jagersfontein	28 17 6	28 17 6
British South Africa	2 12 6	2 12 6	Johannesburg Invest.	3 1 3	3 1 3
Camp Bird	1 6 3	1 7 0	Modderfontein	9 12 6	9 17 6
Con. Gold Fields	6 10 0	6 11 3	Rand Mines	10 0 0	10 2 6
De Beers Con. def.	19 10 0	19 17 6	Rio Tinto, com	48 5 0	49 2 6
East Rand	7 5 7½	7 7 6	Simmer & Jack	1 8 9	1 8 9
El Oro, Mex.	1 9 4½	1 8 9	Tomboy	1 12 6	1 11 3

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

SALT LAKE CITY.* Aug. 22.

Name of Company	Par Val	Shares.	High	Low	Sales.	Name of Company	Par Val	Shares	High	Low	Sales.
Ajax	$10	300,000	.17½	.17	500	N. Y. Bonanza	....	.....	.26	.25	5,700
Carisa	1	300,000	.14	.08	60,300	Ontario	....	.....	5.25	5.25	25
California	1	500,000	.14	.12	6,700	Petro	1	.....	.11	.11	2,500
Century	....	.....	.39	.39	100	Sacramento	5	1,000,000	.25½	.24½	3,100
Con. Mercur	5	1,000,000	1.52	1.48½	1,200	Star Con	....	.....	.17½	.14½	15,400
Daly-Judge	20	300,000	9.25	9.05	850	Silver Shield	....	.....	.08¾	.08½	10,000
Daly-West	1	150,000	41.00	39.75	1,047	Swansea	....	.....	.15	.15	500
E. & B. Pencil	....	.....	1.00	.90	400	Tetro	1	500,000	.04	.03½	2,000
Little Chief	....	.....	.01¾	.01½	1,500	Uncle Sam Con	1	500,000	.22½	.21	3,600
L. Mammoth	20	250,000	.71	.63½	1,200	United States	....	.....	20.00	20.00	50
Mt. Washington	½	300,000	.02½	.02⅛	500	Victor Con	1	500,000	.14½	.13½	5,600
May Day	¼	400,000	.11½	.10½	15,000	Wabash	....	.....	.16¼	.14½	6,200
Naildriver	....	.....	1.27½	1.25	350	Yankee Con	1	500,000	.31½	.29	1,600

*By our Special Correspondent. All mines are in Utah. Total sales, 146,922 shares.

PARIS. Aug. 6

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Boleo	Lower Cal.	Copper	.....	500	176.00	1,374.00	1,415.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	18.75	18.75
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	5.50	5.50
Auzin	France	Coal	.....	.....	290.00	5,740.00	5,800.00
Courrieres	France	Coal	600,000	300	110.00	2,901.00	2,938.00
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	90.50	83.00
Laurium	Greece	Zinc, Lead	16,300,000	500	25.00	342.00	341.00
Metaux, Cie. Fran. de	France	Metal dealers	25,000,000	500	22.50	472.00	480.00
Malfidano	Italy	Ziuc	12,500,000	500	50.00	535.00	563.50
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	455.00	455.00
Sedalia & California	Calif., U. S.	Oil	1,000,000	1	.....	8.25	7.75
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	675.00	670.00
Wyoming	California	Oil	.....	25	.....	280.00	280.00
Dombrowa	Russia	Coal	.....	500	12.50	.....	.....
Mokta-el-Hadid	Algeria	Iron	18,312,000	500	40.00	825.00	801.00
Almeda	California	Oil	1,000,000	1	9.50	9.50	9.50
Canadian Am	Can	Coal	.....	500	.....	29.65	29.75

PHILADELPHIA, PA.*

Name and Location of Co.	Par val.	Aug. 19. H.	Aug. 19. L.	Aug. 20 H.	Aug. 20 L.	Aug. 21. H.	Aug. 21. L.	Aug. 22. H.	Aug. 22. L.	Aug. 24. H.	Aug. 24. L.	Aug. 25. H.	Aug. 25. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	.....	.....	7¾	7¼	7	.....	.....	.....	7½	7⅜	7⅜	7½	418
Cambria Iron, Pa	50	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34
Cambria S., Pa.	50	22⅜	22	22	21¾	22	21¾	22	.....	22	21¾	22¼	22	3,033
Penn. Steel, pfd	100	.....	.....	.....	.....	.....	.....	.....	.....	83	.....	84	.....	15
Susq. I & S., Pa	5	1	.....	1	.....	.....	.....	.....	.....	1	.....	1	.....	405
United Gas I. Pa	50	85	84	84	.....	84½	84	84	83⅞	84	.....	.....	.....	393
Warwick I. & S.	10	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	37
Diamond Steel	50	.....	.....	.....	.....	.....	.....	.....	.....	1 1/16	.....	.....	.....	300
Lehigh Navig'n	50	69⅛	69	.....	.....	69	.....	.....	.....	69	.....	.....	.....	105
Philadelphia	50	40¾	40¼	40	39¾	40¼	39⅞	40¼	.....	40	39¼	39¾	.....	1,631
U. S. Steel	100	24¼	22⅛	22¾	22	23¼	21⅛	22	21¾	22¼	21¾	22⅞	22¼	26179
U. S. Steel, pf.	100	72¼	71⅜	70¾	.....	70¼	70	.....	.....	69⅞	.....	.....	.....	894

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 9,444 shares,

ST. LOUIS, MO. Aug. 22.

Name.	Par Val.	Shares.	Prices. Bid.	Prices. Ask.	Name.	Par Val.	Shares.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo.	$10	300,000	$0.50	$0.75	Columbia Lead, Mo.	$10	50,000	$10.00	11.00
Catherine Lead, Mo.	10	50,000	1.25	2.25	Con. Coal, Ill.	100	50,000	22.00	23.00
Central Coal & C.	100	51,250	63.00	64.00	Doe Run Lead Co.	100	15,000	110.00	120.00
Central C. & C., pf.	100	18,750	73.00	74.50	Granite Bimet. Mt.	10	100,000	.35	.40
Central Lead, Mo.	10	100,000	110.00	120.00	St. Joe Lead, Mo.	10	600,000	16.00	17.00

*By our Special Correspondent.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

	Cust.	Meas.	Price.
ABRASIVES—			
Carborundum, f.o.b. Niagara Falls, Powd., F. FF. FFF.	lb.		$0.08
Grains	"		.10
Corundum, N. C.	"		.07@.10
Chester, Mass.	"		.04½@.05
Barry's Bay, Ont.	"		.07½@.09¼
Mont. car-lots, f.o.b. Chicago	"		.07@.07½
Crushed Steel, f.o.b. Pittsburg	"		.05½
Emery, Turkish flour in kegs	"		.03¼
Grains, in kegs	"		.03@.05½
Naxos flour, in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Chester flour, in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"		.01½
Grains, in kegs	"		.02¼
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton		26.50@30.00
Kuluk (Turkey)	"		22.00@24.00
Naxos (Greek) h. gr.	"		26.00
Garnet, as per quality	sh. ton		25.00@35.00
Pumice Stone, Am. Powd.	lb.		.01½@.02
Italian, powdered	"		.01½
Lump, per quality	"		.04@.40
Rottenstone, ground	"		.02½@.04¼
Lump, per quality	"		.06@.20
Rouge, per quality	"		.10@.30
Steel Emery, f.o.b. Pittsburg	"		.07
ACIDS—			
Boracic, crystals	"		.10¾@.11
Powdered	"		.11¼@.11½
Carbonic, liquid gas	"		.12½
Chromic, crude	"		.20
Hydrofluoric, 30%	"		.03
48%	"		.05
60%	"		.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"		.06
ALCOHOL—Grain	gal.		2.39@2.40
Refined wood, 95@97%	"		.60@.65
Purified	"		1.20@1.50
ALUM—Lump	100 lbs.		1.75
Ground	"		1.85
Porous	"		1.00
Powdered	"		3.00
Chrome, com'l	"		2.75@3.00
ALUMINUM—			
Nitrate	lb.		1.50
Oxide, com'l, common	"		.06½
Best	"		.20
Pure	"		.80
Hydrated	100 lbs.		2.60
Sulphate, com'l	"		1.25@1.50
AMMONIA—			
Aqua, 16°	lb.		.03
18°	"		.03¼
20°	"		.03¾
26°	"		.05½
AMMONIUM—			
Carbonate, lump	"		.07½
Powdered	"		.08¼
Muriate	"		.05½
Lump	"		.09
Nitrate, white pure (93%)	"		.12
Phosphate, com'l	"		.09
Pure	"		.12
ANTIMONY—Glass	"		.30@.40
Needle, lump	"		.05½@.06
Powdered, ordinary	"		.05¾@.07¾
Oxide, com'l white, 95%	"		.03½
Com'l white, 95%	"		.12
Com'l gray	"		.07
Sulphuret, com'l	"		.16
ARSENIC—White powd.	"		.02¾@.03
Red	"		.06¾@.06½
ASPHALTUM—			
Ventura, Cal.	sh. ton		32.00
Cuban	lb.		.01½@.03½
Egyptian, crude	"		.05¼@.06
Trinidad, refined	sh. ton		35.00
San Valentino (Italian)	lg. ton		16.00
Seyssel (French), mastic	sh. ton		21.00
Gilsonite, Utah, ordinary	lb.		.03
Select	"		.03¾
BARIUM—			
Carb. Lump, 80@90%	sh. ton		25.00@27.00
92@98%	"		28.00@29.00
Powdered, 80@90%	lb.		.01¾@.02
Chloride, com'l	100 lbs.		1.67½@1.76
Chem. pure cryst	lb.		.05
Nitrate, powdered	"		.05⅞

	Cust.	Meas.	Price.
BARIUM			
Sulphate (Blanc Fixe)	lb.		$0.01⅞
BARYTES—			
Am. Crude, No. 1	sh. ton		6.00
Crude, No. 2	"		8.00
Crude, No. 3	"		7.75
Floated	"		18.50
Foreign gray	"		13.50
Snow white	"		17.00
Floated	"		18.00
BAUXITE—Ga. or Ala. Mines:			
First grade	lg. ton		5.50
Second grade	"		4.75
BISMUTH—Subnitrate	lb.		2.00
Subcarbonate	"		2.25
BITUMEN—"B"	"		.03½
"A"	"		.05
BONE ASH	"		.02¼@.02½
BORAX	"		.07¼@.07½
BROMIDE—Bulk	"		.48
CADMIUM—Metallic	"		1.40
Sulphate	100 lbs.		2.00@2.50
CALCIUM—Acetate, gray	"		1.40
" brown	"		.95
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton		70.00
Carbonate, ppt	lb.		.05
Chloride	100 lbs.		.70@.90
CEMENT—			
Portland, Am., 400 lbs.	bbl.		2.00@2.15
Foreign	"		1.95@2.50
"Rosendale," 300 lbs.	"		.80
Slag cement	"		1.50@1.60
CERESINE—			
Orange and Yellow	lb.		.13
White	"		.14
CHALK—Lump, bulk	sh. ton		3.25
Ppt. per quality	lb.		.04@.05¼
CHLORINE—Liquid	"		.30
Water	"		.10
CHROME ORE			
(50% ch.) ex-ship N. Y.	lg. ton		24.75
Bricks f.o.b. Pittsburg	M		175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg. ton		8.25
Am. best, ex-dock, N. Y.	"		9.25
English, common	"		10.50
Best grade	"		16.25
Fire Clay, ordinary	sh. ton		4.25
Best	"		6.00
Slip Clay	"		5.00
COAL TAR PITCH	gal.		.08
COBALT—Carbonate	lb.		1.75
Nitrate	"		1.50
Oxide - Black	"		2.26@2.30
Gray	"		2.28@2.40
Smalt, blue ordinary	"		.06
Best	"		.20
COPPERAS—Bulk	100 lbs.		.47½
In bbls	"		.52½
COPPER—Carbonate	lb.		.18@.19
Chloride	"		.25
Nitrate, crystals	"		.35
Oxide, com'l	"		.19
CRYOLITE	"		.06½
EXPLOSIVES—			
Blasting powder, A	25-lb. keg		.65
Blasting powder, B	"		1.40
"Rackarock," A	lb.		.25
"Rackarock," B	"		.18
Judson R.R. powder	"		.10
Dynamite (20% nitro-glycerine)	"		.13
(30% nitro-glycerine)	"		.14
(40% nitro-glycerine)	"		.15
(50% nitro-glycerine)	"		.16½
(60% nitro-glycerine)	"		.18
(75% nitro-glycerine)	"		.21
Glycerine for ultro (32-2-10° Be.)	"		.13¼@.13⅞
FELDSPAR—Ground	sh. ton		8.00@9.00
FLINT PEBBLES—Dan. Best	lg. ton		14.75
French, Best	"		11.75
FLOURSPAR—			
Am. lump, 1st grade	sh. ton		14.40
2d grade	"		13.90
Gravel and crushed, 1st gr.	"		13.40
2d grade	"		12.40
Ground, 1st grade	"		17.80
Ground, 2d grade	"		16.50
Foreign, lump	"		8.00@12.00
Ground	"		11.50@14.00
FULLER'S EARTH	100 lbs.		.80

	Cust.	Meas.	Price.
GRAPHITE—Am. f.o.b. Providence, R. I., lump	sh. ton		$8.00
Pulverized	"		30.00
Am. pulv., other than R. I., f. o. b., New York	"		45.00
Best flake	"		150.00
German, com. pulv	lb.		.01¼@.01½
Best pulverized	"		.01½@.02
Ceylon, common pulv	"		.02¾@.03½
Best pulverized	"		.04@.08
Italian, pulv	"		01¼
GYPSUM—Ground	sh. ton		8.00@8.50
Fertilizer	"		7.00
Rock	lg. ton		4.00
English and French	"		14.00@16.00
INFUSORIAL EARTH—Gr'd.			
American best	"		20.00
French	"		37.50
German	"		40.00
IODINE—Crude	100 lbs.		2.45
IRON—Muriate	lb.		.05
Nitrate, com'l	"		.01¾
True	"		.04
Oxide, pure copperas color	"		.05@.10
Purple-brown	"		.02
Venetian red	"		.01@.01½
Scale	"		.01@.03
KAOLIN—(See China Clay.)			
KRYOLITH—(See Cryolite.)			
LEAD—Acetate, white	"		.08¼@.08½
Brown	"		.06¼@.06½
Nitrate, com'l	"		.06½
" gran	"		.08¼
LIME—Com., abt. 250 lbs.	bbl.		.75
Finishing	"		.95
MAGNESITE—Greece.			
Crude (95%)	lg. ton		5.50@6.00
Calcined	sh. ton		15.50
Bricks, best imp., f.o.b. N.Y.	M.		155.00
" domes., per qual., f.o.b. Pittsburg	"		180.00@200.00
MAGNESIUM—			
Carbonate, light, fine pd.	lb.		.05
Blocks	"		.07@.09
Chloride, com'l	"		.01¾
Fused	"		.20
Nitrate	"		.60
Sulphate	100 lbs.		.75@.95
MANGANESE—			
Crude powd.			
70@75% binoxide	lb.		.01¼@.01½
75@85% binoxide	"		.01½@.02¼
85@90% binoxide	"		.02¼@.03¼
90@95% binoxide	"		.03¼@.05½
Carbonate	"		.16@.20
Chloride	"		.04
Ore, 50%, Foreign	unit		.18@.19
Domestic	"		.30
MARBLE—Flour	sh. ton		6.00@7.00
MERCURY—Bichloride	lb.		.77
MICA—N. Y. gr'nd, coarse	sh. ton		33.00@38.00
Fine	lb.		.00⅞@.02
Sheets, N. C., 2x4 in.	"		.30
3x3 in	"		.80
3x4 in	"		1.50
4x4 in	"		2.00
6x6 in	"		3.00
MINERAL WOOL—			
Slag, ordinary	sh. ton		19.00
Selected	"		25.00
Rock, ordinary	"		32.00
Selected	"		40.00
NICKEL Oxide, No. 1	lb.		1.00
No. 2	"		.60
Sulphate	"		.20@.21
OILS—Black, reduced 29 gr.:			
25@30, cold test	gal.		.13@.13½
15, cold test	"		.14@.14½
Zero	"		.18½@.19
Summer	"		.13@.13½
Cylinder, dark steam ref.	"		.14½@.15½
Dark, filtered	"		.18½@.19
Light, filtered	"		.20½@.21
Extra cold test	"		.25@.31
Gasoline, 86°@90°	"		.17@.22
Naphtha, crude, 68°@72°	bbl.		12.40
"Stove"	gal.		.15
Linseed, domestic raw	"		.34@.37
Boiled	"		.38
Calcutta, raw	"		.65
OZOKERITE	lb.		.11½
PAINTS AND COLORS—			
Chrome green, common	"		.03
Pure	"		.16
Yellow, common	"		.10¼
Best	"		.14
Lampblack, com'l	"		.04½
Refined	"		.07
Litharge, Am. pow'd	"		.05½@.06
English flake	"		.08¼@.08½
Glassmakers'	"		.06½@.08¼

	Cust.	Meas.	Price.
PAINTS AND COLORS—			
Metallic, brown	sh. ton		$19.00
Red	"		15.00
Ocher, Am. common	"		9.25@10.00
Best	"		21.25@25.00
Dutch, washed	lb.		.04¾
French, washed	"		.01¼@.01⅝
Orange mineral, Am.	"		.08¼@.08⅝
Foreign, as to make	"		.08¼@.10¾
Paris green, pure, bulk	"		.12
Red lead, American	"		.06¾@.06¾
Foreign	"		.0 5/8@.08
Turpentine, spirits	gal.		.51½ @.55½
White lead, Am., dry	lb.		.05½@.05¾
American, in oil	"		.07@.09
Foreign, in oil	"		.07@.07¼
Zinc, white, Am., ex. dry	"		.04⅝@.04¾
Foreign, red seal, dry	"		.06@.08½
Green seal, dry	"		.03¾@.09½
POTASH—			
Caustic, ordinary	"		.04½@.04⅝
Elect. (90%)	"		.06¼
POTASSIUM—			
Bicarbonate cryst	"		.08¼
Powdered or gran.	"		.14
Bichromate, Am	"		.08¾@.08¾
Scotch	"		.08½@.09
Bromide	"		.25@.38
Carbonate (80@85%)	"		.03¼@.04⅜
Chlorate, powd	"		.07¼@.07⅜
Crystals	"		.07@.07¼
Chromate	"		.35
Cyanide (98@99%)	"		.20
Kainit	lg. ton		9.30
Manure salt, 20%	100 lbs.		.66
D'le Manure Salt, 48@53%	"		1.12
Muriate, 80@85%	"		1.83
95%	"		1.86
Permanganate	lb.		.09¼@.09⅝
Prussiate, yellow	"		.13¼@.13½
Red	"		.34
Sulphate, 90%	100 lbs.		2.11
96%	"		2.14
Sylvanit	unit		.41
QUARTZ—(See Silica).			
SALT—N. Y. com. fine 280 lbs	bbl.		.72@1.18
N. Y. agricultural	sh. ton		4.40
SALTPETRE—Crude	100 lbs.		3.20@3.25
Refined	"		4.00@4.50
SILICA—Best foreign	lg. ton		10.00@11.00
Ground quartz, ord.	sh. ton		6.00@8.00
Best	"		12.00@13.00
Lump quartz	"		2.50@4.00
Glass sand	"		2.75
SILVER—Chloride	oz.		.65
Nitrate Crystals	"		.35½
Oxide	"		.85@1.10
SODIUM—			
Bicarb., ord., bulk f.o.b. wk's.	100 lbs.		1.25
Extra domes., f.o.b. w'ks.	"		3.50
Foreign, f.o.b. N. Y.	"		1.60
Bichromate	lb.		.06¼
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.		.75@.85
Foreign, f.o.b. N. Y.	"		.90@.92½
Caustic, 60@76%, f.o.b. w'ks.	"		1.65@1.80
Foreign, f.o.b N. Y.	"		1.50@2.00
Chlorate, com'l	"		.07½@.07⅝
Hyposulphite, Am.	"		1.60@1.65
German	"		1.70@1.90
Nitrate, spot	"		2.25
Shipments	"		2.05
Peroxide	lb.		.45
Phosphate	"		.02½@.02¾
Prussiate	"		.09¾
Sal soda, f.o.b. works	100 lbs.		.60
Foreign, f.o.b. N. Y.	"		.67½
Silicate, conc	lb.		.05
Com'l	"		.01
Sulphate, com'l	100 lbs.		.82½
Sulphide	lb.		.01¼
Sulphite crystals	"		.02½
SULPHUR—Roll	100 lbs.		1.85
Flour	"		1.90
Flowers, sublimed	"		2.15
TALC—N. C., 1st grade	sh. ton		20.00
N. Y., Fibrous, best	"		10.28
French, best	100 lbs.		2.00
Italian, best	"		2.25
TAR—Regular	bbl.		2.50
Oil, bbl.	"		4.75
TIN—Crystals	lb.		.22½@.23
Oxide	"		.45
URANIUM—Oxide	"		2.25@3.00
ZINC—Metallic, ch. pure	"		.07@.09%
Carbonate, ppt	"		.09
Chloride solution, com'l	"		.02¼
Chloride granular	"		.04¼@.04⅜
Dust	"		.04⅜@.04½
Sulphate	"		.02½@.02⅝

THE RARE EARTHS.

BORON—Nitrate	lb.		$1.50
CALCIUM—Tungstate (Scheelite)	"		.60
CERIUM—Nitrate	"		10.00
DIDYMIUM—Nitrate	"		35.00
ERBIUM—Nitrate	"		40.00
GLUCINUM—Nitrate	"		20.00
LANTHANUM—Nitrate	"		30.00
LITHIUM—Carbonate	"		1.35
LITHIUM—Nitrate	oz.		.60
STRONTIUM—Nitrate	lb.		.07½@.08¾
THORIUM—Nitrate 49@50%	"		4.50
URANIUM—Nitrate	oz.		.25
YTTRIUM—Nitrate	lb.		40.00
ZIRCONIUM—Nitrate	"		8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.